

IOWATER Biological Stream Assessment Report (2000-2008)

IOWATER Program
109 Trowbridge Hall
Iowa City, IA 52242-1319
www.iowater.net

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Introduction

Iowa's volunteer water quality monitoring program, IOWATER, began as an idea in 1998 and has since grown into a network of volunteers across the state dedicated to monitoring Iowa's water resources. Between 2000 and 2008 there were 2,913 Level 1 Certified IOWATER volunteers trained and 4,024 monitoring sites registered. The IOWATER program provides training, equipment and technical support to volunteers, while the volunteers decide where, when, and what they will monitor.

At the Level 1 training, volunteers are instructed on how to complete four different assessment types: chemical/physical, habitat, biological, and standing waters. The biological stream assessment includes the monitoring of benthic macroinvertebrate populations. Benthic macroinvertebrates are identified and recorded based on presence or absence and are generally identified to the order level. They are divided into three categories: pollution intolerant, somewhat pollution tolerant, and pollution tolerant (Hilsenhoff 1982).

From 2000 through 2008, 3,675 biological assessments were completed at 1,185 different sites in Iowa and Minnesota (Figure 1). Eleven of these sites were located in Minnesota. The number of biological assessments and sites per year is summarized in Figure 2. The maximum number of sites monitored and individual biological assessments completed occurred in 2001.

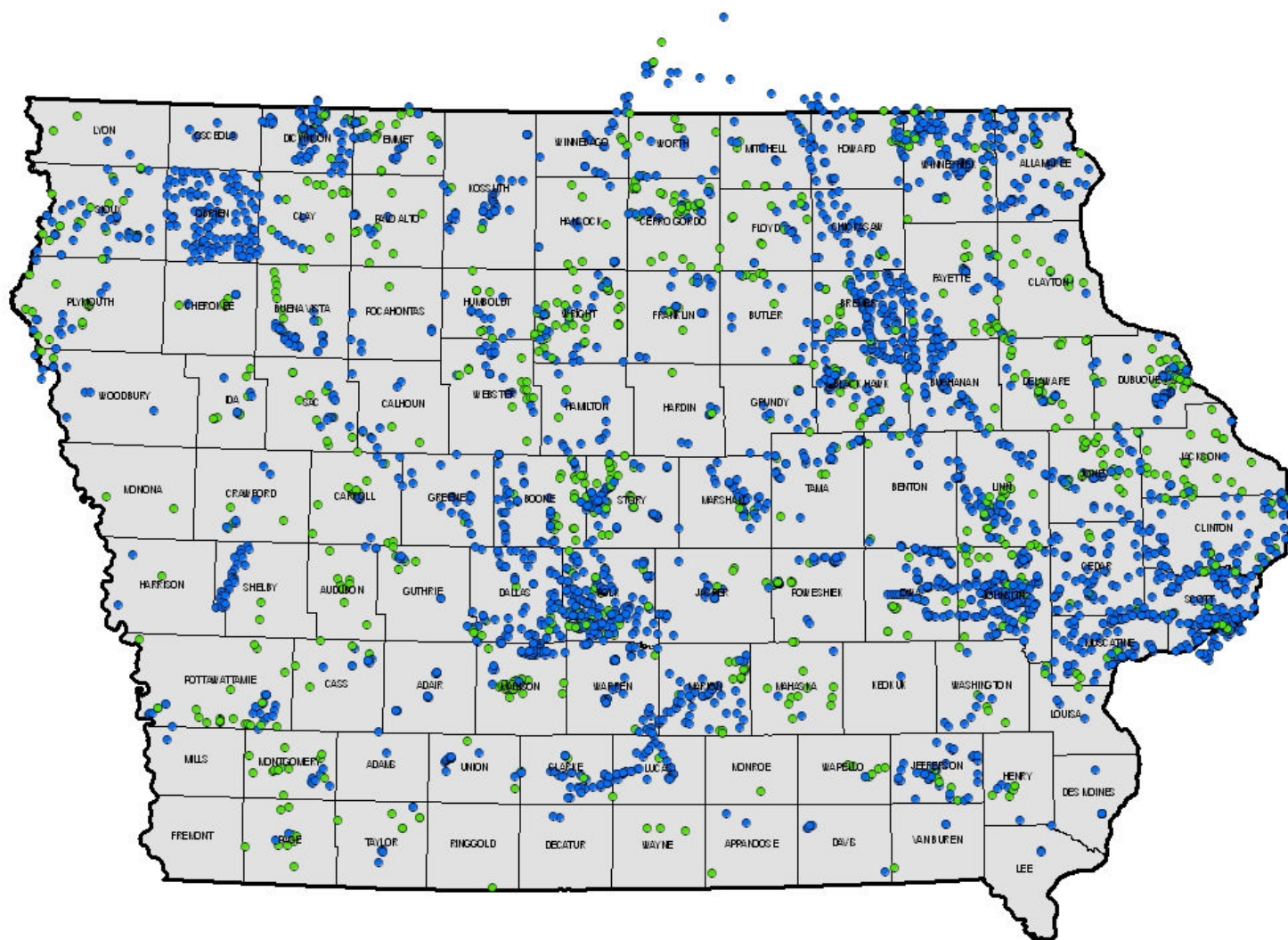
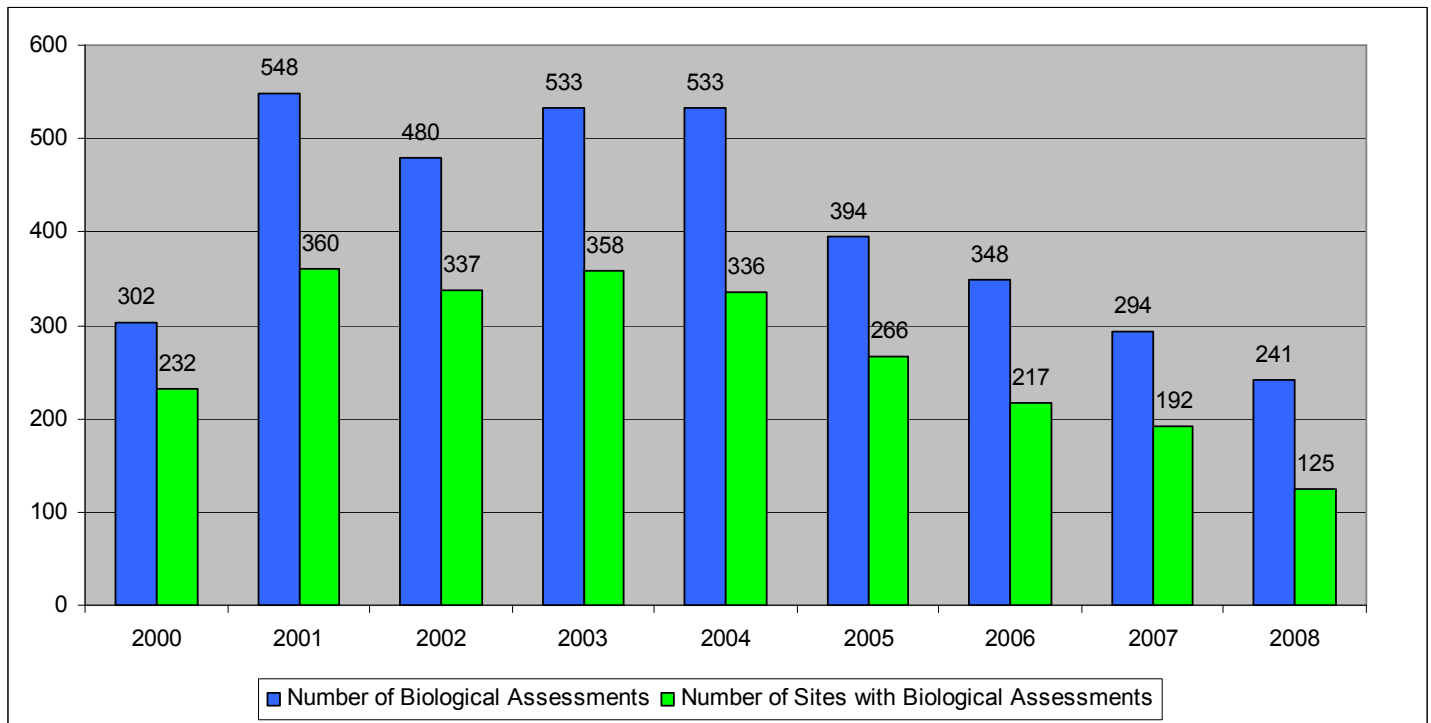


Figure 2. IOWATER Level 1 Biological Stream Assessments (2000 - 2008)



Materials and Methods

Volunteers register a specific site using geographic information (Universal Transverse Mercator or UTM coordinates). Volunteers are encouraged to choose a site location that is representative of the water body. The frequency of assessments is determined by the individual volunteers; however, IOWATER provides recommended frequencies for each assessment. Volunteers are encouraged to conduct biological assessments no more than 3 times per year (spring, summer, and fall).

All volunteers are given a complete set of the equipment necessary to do the biological assessment when they complete an IOWATER Level 1 workshop. This includes a dip-net, identification key (Appendix 1), sample container, and magnifying cube for benthic macroinvertebrate collection. Volunteers are instructed to sample their entire stream reach in an attempt to collect as diverse a group of benthic macroinvertebrates as possible. A stream reach is defined as one set of riffle, run, and pool habitats or a set distance identified by the volunteer. The sampling technique includes using benthic dip-nets to collect the benthic macroinvertebrates from the stream and depositing them into a sample container with about an inch of water covering the bottom. Volunteers are instructed that it is very important to sample all microhabitats within their stream reach. Benthic macroinvertebrates found are identified and recorded on the Biological Assessment field form (Appendix 2) along with all the microhabitats that are present and sampled. For full method description refer to the IOWATER Program Manual located at www.iowater.net.

Results

Benthic Macroinvertebrate Sampling by IOWATER Volunteers

The frequency and timing of biological assessments by IOWATER volunteers varied greatly during the period from 2000-2008. Appendix 3 includes time series graphs for the 46 IOWATER sites that have 10 or more biological data sets.

Habitat Data

Run habitats were most often sampled; however volunteers also sampled riffles and pools (Figure 3). In 2006, IOWATER volunteers started to submit additional habitat data with the biological assessment. These data included information on the types of habitats and microhabitats present at the volunteer's site and which were sampled for the biological assessment. For biological assessments with these data, the number of microhabitats sampled in each assessment is displayed in Figure 4. The most common microhabitat types sampled were silt & muck, sand, rock piles, root wads, fallen trees, cut banks, and overhanging vegetation.

Figure 3. Habitat types sampled (2000-2008)

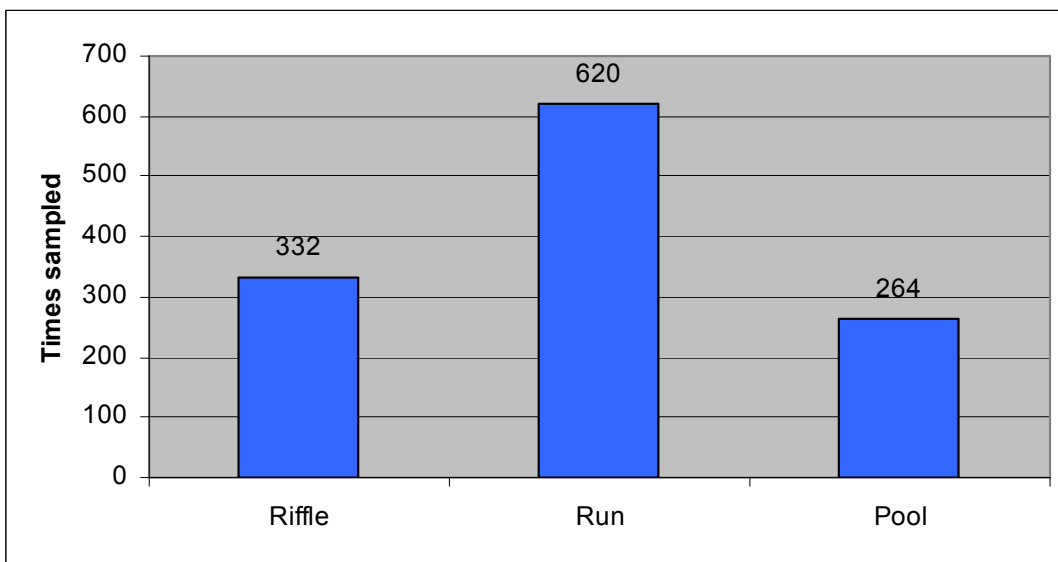
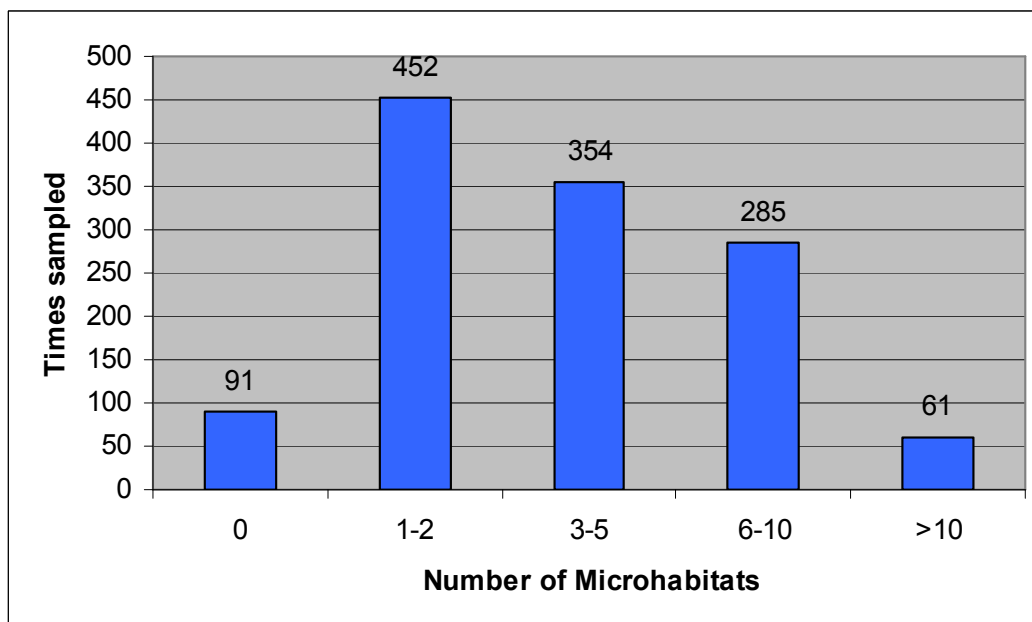


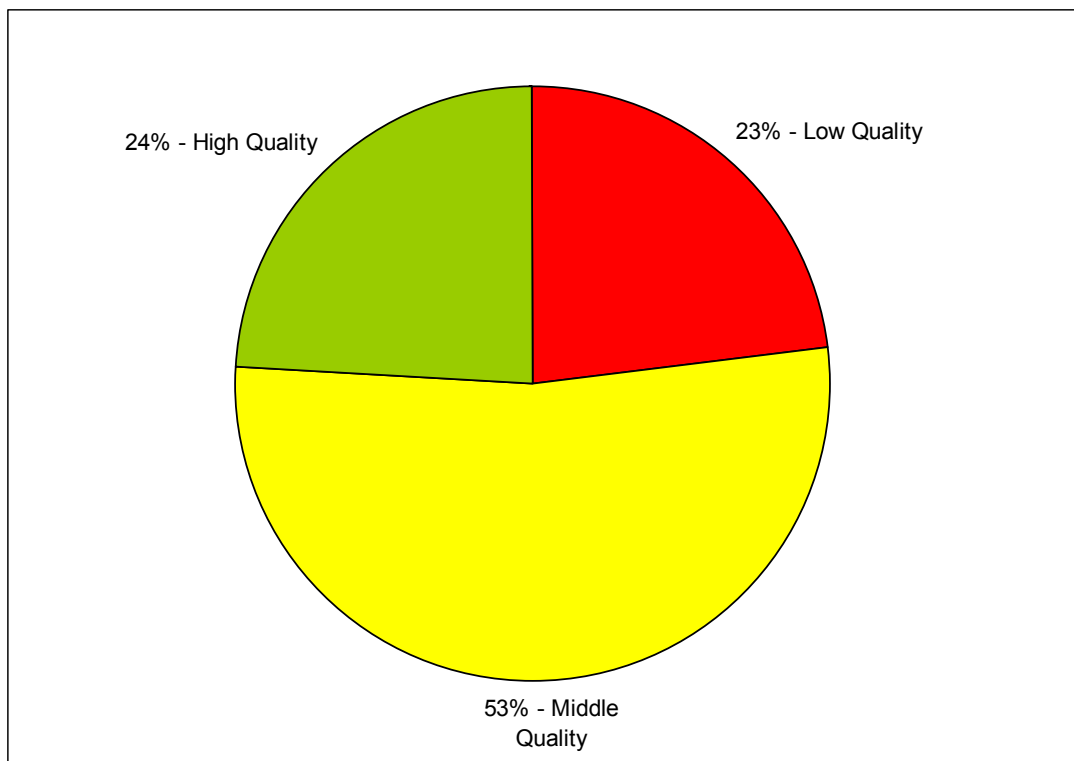
Figure 4. Number of microhabitats sampled in each assessment (2006-2008)



Benthic Macroinvertebrate Populations

For sites with biological assessments, the benthic macroinvertebrate population statewide indicated a diverse population. Using the three categories of tolerance values used in the IOWATER Level 1 program, 23% of the benthic macroinvertebrates sampled were high quality, 53% were middle quality, and 24% were low quality (Figure 5).

Figure 5. Benthic macroinvertebrate tolerance distribution for all IOWATER sites with Level 1 biological assessments (2000-2008)



Benthic Macroinvertebrate Index of Biotic Integrity

A simplified Benthic Macroinvertebrate Index of Biotic Integrity (IBI) using the IOWATER tolerance groups of High, Middle, and Low Quality has been created. The High Quality (HQ) benthic macroinvertebrates were given a tolerance score of 3, the Middle Quality (MQ) a score of 2, and the Low Quality (LQ) a score of 1. For each site a metric is calculated by multiplying the number of benthic macroinvertebrates in each group by that group's tolerance score. These values are summed and then divided by the total number of benthic macroinvertebrates (TBMs) identified at the site (Figure 6).

Figure 6. Benthic Macroinvertebrate Index of Biotic Integrity

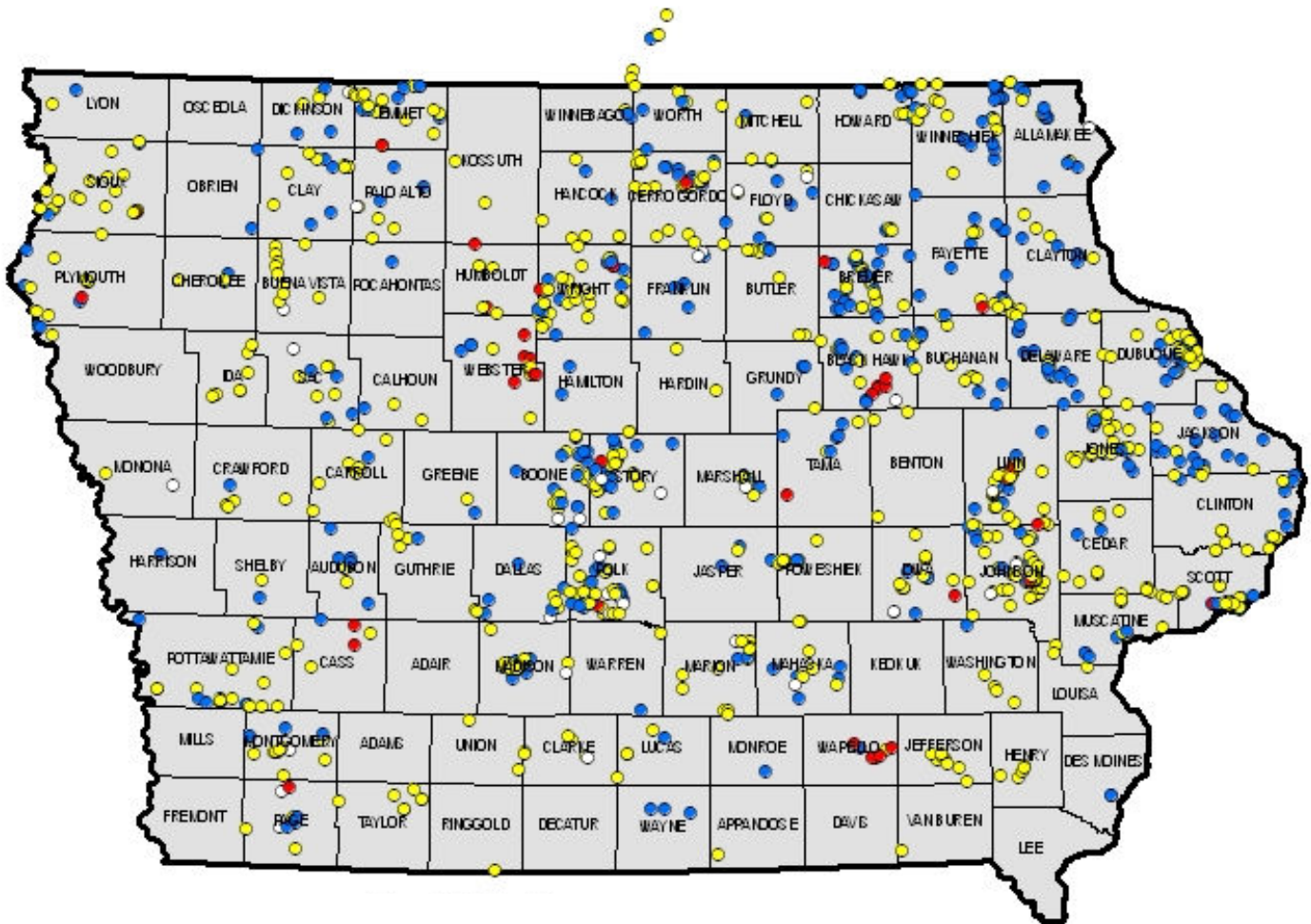
$$IBI = (\#HQ*3) + (\#MQ*2) + (\#LW*1) / TBMs$$

IBIs 1 - 1.75 would indicate a poor benthic macroinvertebrate population. Sites with IBIs falling into this range would be dominated by benthic macroinvertebrates in the low quality tolerance group. High quality benthic macroinvertebrates would be rare at sites falling into this range. IBIs ranging from 1.76 - 2.5 would indicate a fair benthic macroinvertebrate population. Sites with IBIs falling into this range would be dominated by benthic macroinvertebrates in the middle quality tolerance group; however sites may have low and high quality benthic macroinvertebrates present. IBIs ranging from 2.5 - 3 would indicate a good benthic macroinvertebrate population. Sites with IBIs falling into this range would be dominated by benthic macroinvertebrates in the high

quality tolerance group and would also include benthic macroinvertebrates in the low and middle quality tolerance groups. Sites without benthic macroinvertebrates are labeled as “Not Assessed”.

The IBI was calculated for 1,185 sites that had at least one biological assessment (Figure 7). IBIs were averaged for sites with multiple biological assessments. Forty-three sites were in the “Poor” category (3.63%), 677 sites were in the “Fair” category (57.13%), 420 sites were in the “Good” category (35.44%) and 45 sites were in the “Not Assessed” category (3.80%).

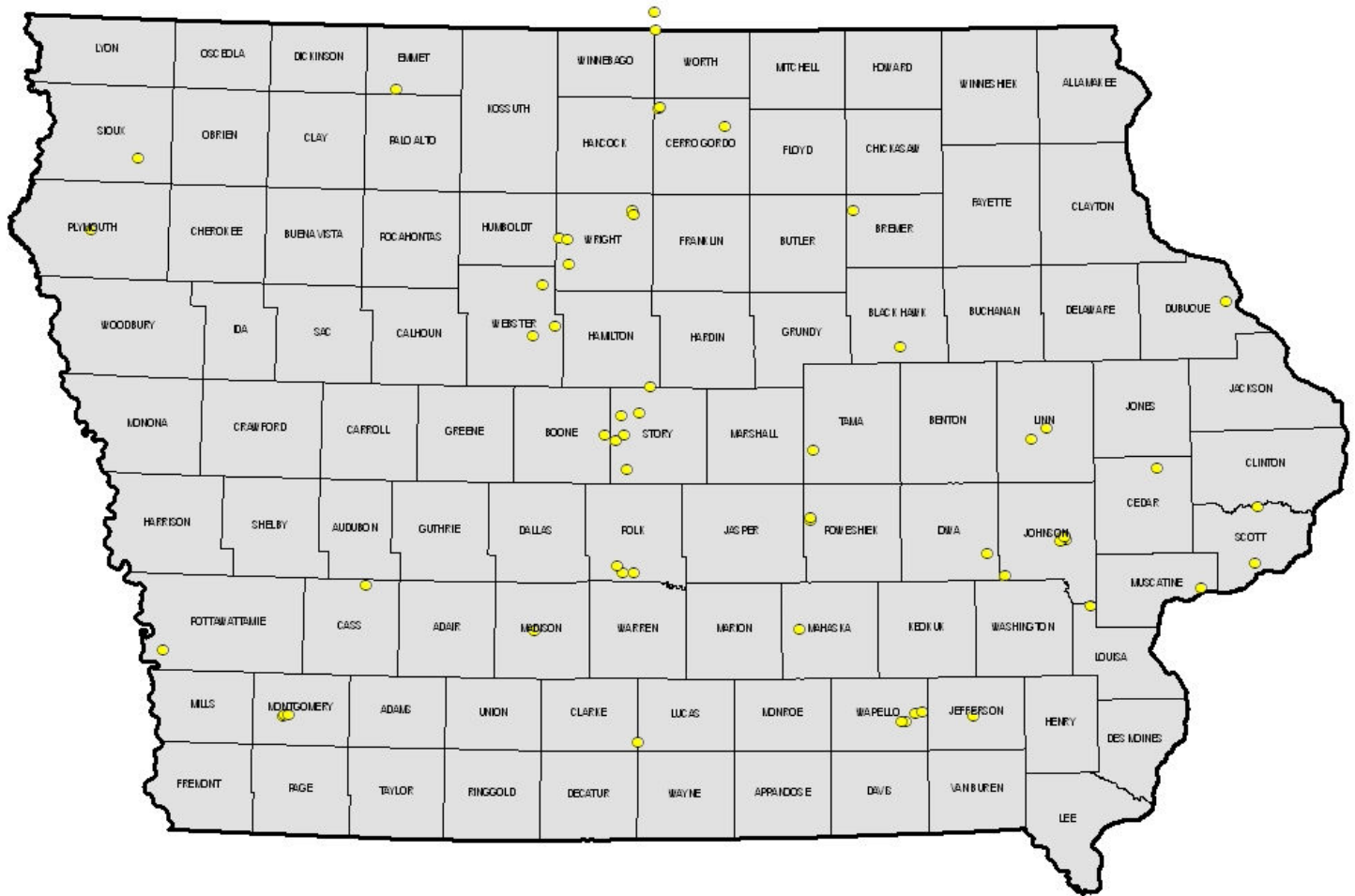
Figure 7. Benthic Macroinvertebrate Index of Biotic Integrity (2000-2008)



Low Quality Benthic Macroinvertebrate Populations

At 62 sites, low quality benthic macroinvertebrates (pollution tolerant) were the only benthic macroinvertebrates found during 245 biological assessments (Figure 8). Sites where only low quality benthic macroinvertebrates are found would be good candidates for additional monitoring.

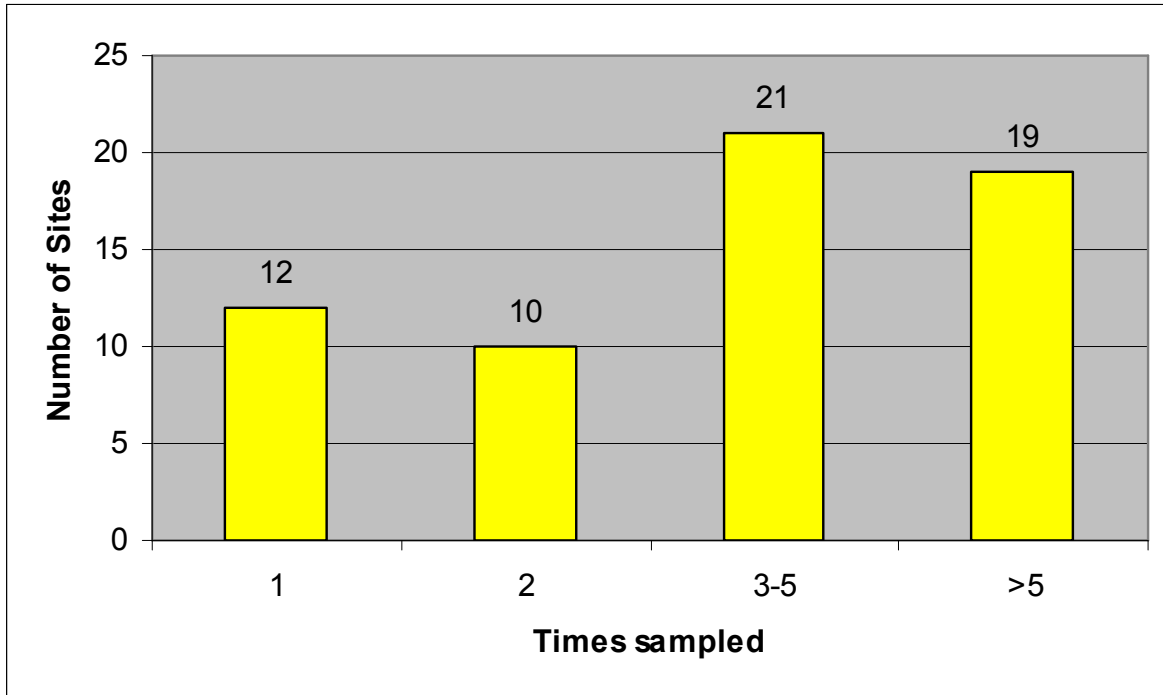
Figure 8. IOWATER sites where only low-quality benthic macroinvertebrate populations were found (2000-2008)



Volunteers that provided comments about these sites most often indicated that the water was higher or lower than normal, flow was blocked by obstructions, the stream was dry, water was frozen, or had poor habitat conditions. At 11 sites, comments were provided that types of life in the stream such as turtles, frogs, and fish were present. There were also a few comments about oily sheens, colored water, sewage odor, and only bloodworms being found.

For sites that have at least one occurrence of only low quality benthic macroinvertebrates found, Figure 9 displays the number times those sites have been sampled. Most sites that were sampled more than once consistently had poor to fair IBI scores with the exception of 11 sites that had an IBI as high as 3.

Figure 9. Sampling frequency of sites with only low-quality benthic macroinvertebrates (2000-2008)



At sites with only low-quality or pollutant tolerant invertebrates, run habitats were most often sampled; however volunteers also sampled riffles and pools at these sites (Figure 10). In 2006, IOWATER volunteers started to submit additional habitat data with the biological assessment. For sites with these data, microhabitats were also not recorded or few were recorded in sites where only low quality benthic macroinvertebrates were found (Figure 11). The most common microhabitat types sampled were mud & silt, sand, leaf packs, rock piles, root wads, weed beds, fallen trees, cut banks and overhanging vegetation (Figure 12).

Figure 10. Habitat sampling of sites with only low quality benthic macroinvertebrates (2000-2008)

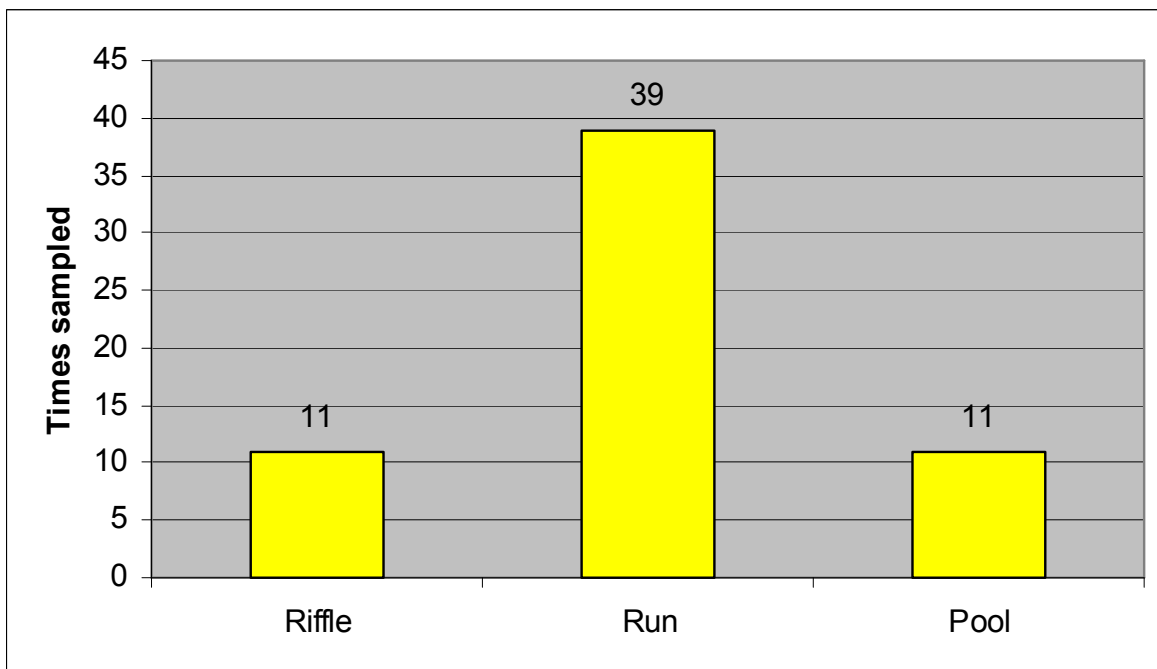


Figure 11. Number of microhabitats that were sampled per site at sites with only low-quality benthic macroinvertebrates (2006-2008)

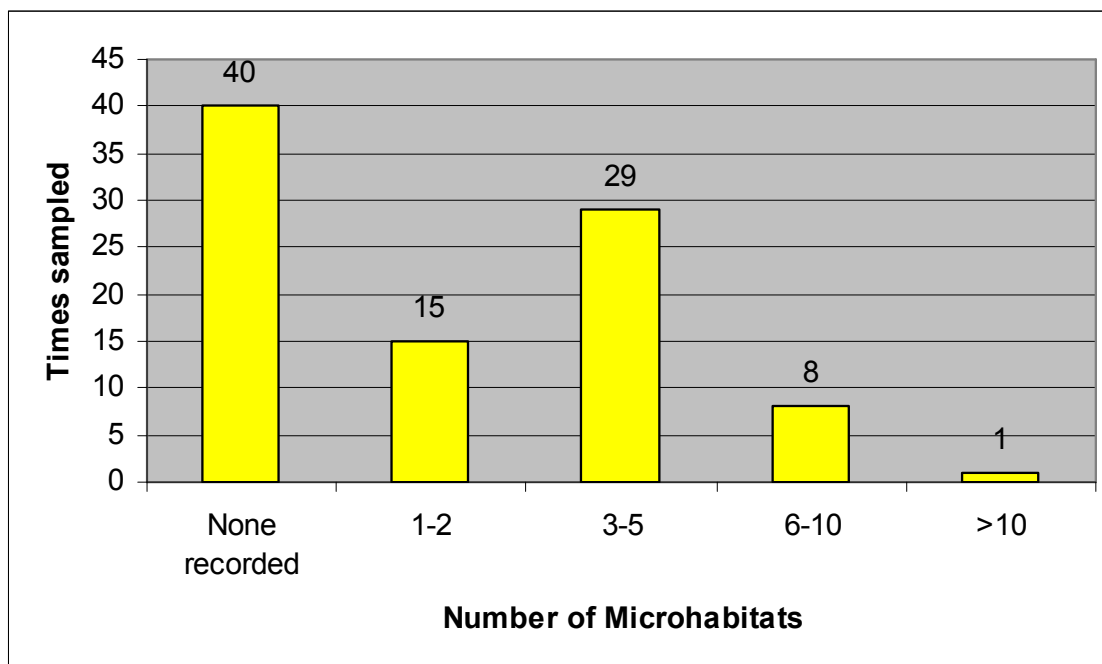
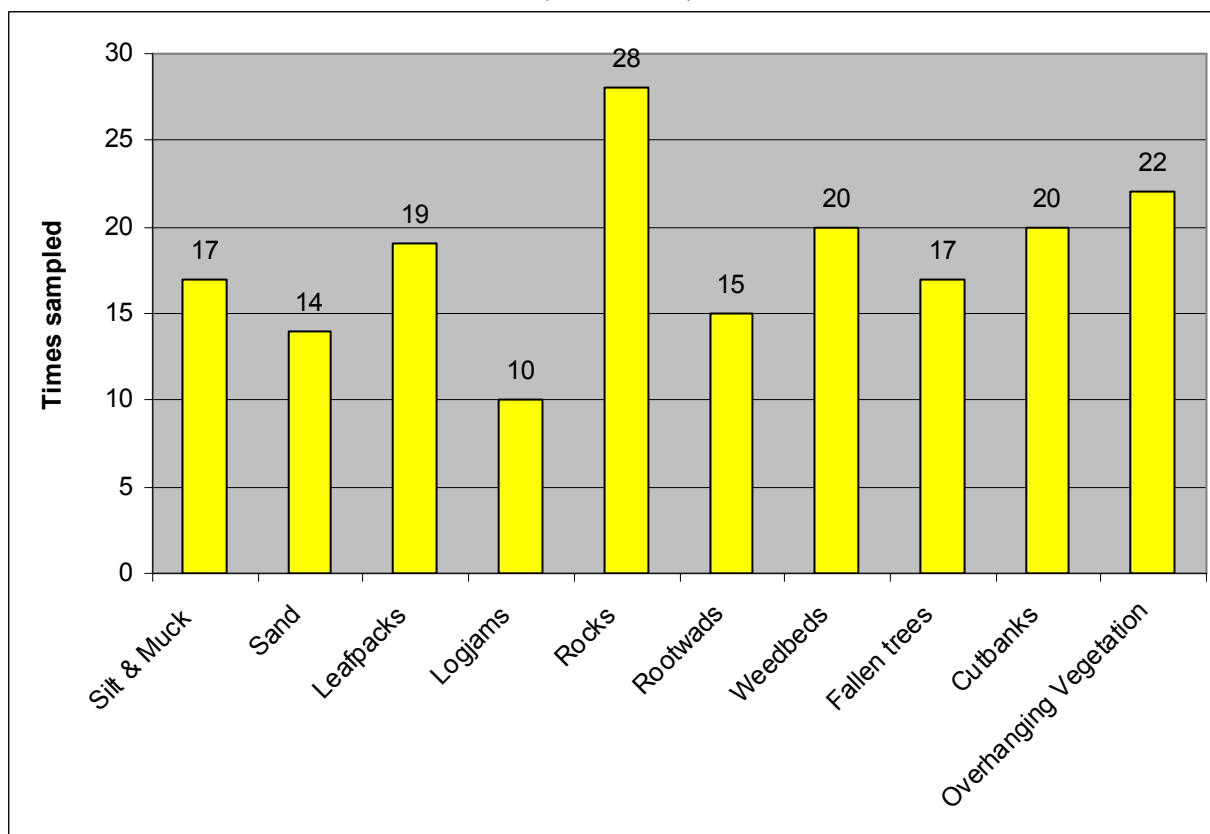


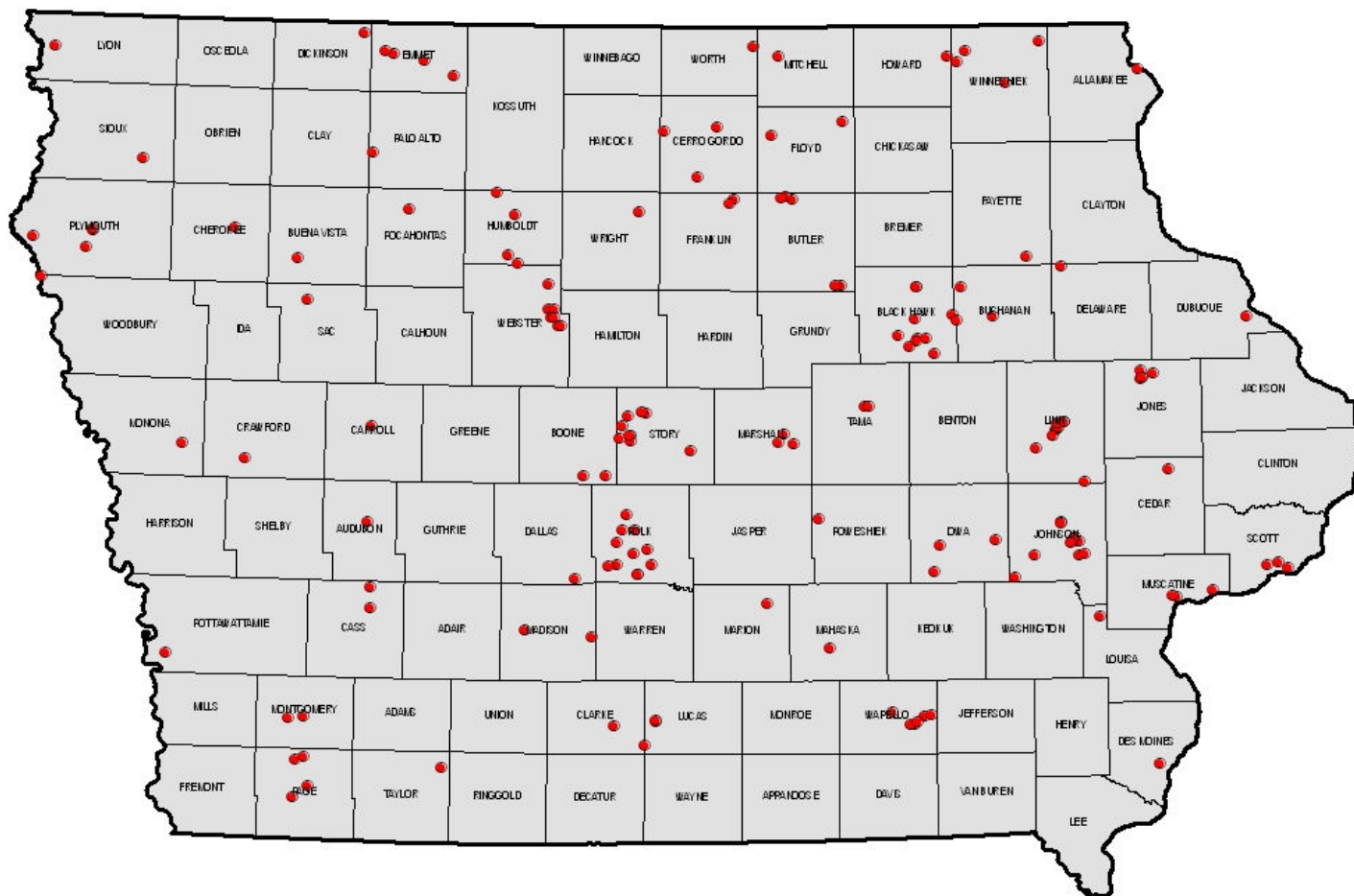
Figure 12. Sampling of microhabitats at sites with only low-quality benthic macroinvertebrates (2006-2008)



Sites without Benthic Macroinvertebrates

Two hundred and forty-two of the 3,675 datasets recorded no benthic macroinvertebrates during the time period from 2000-2008. These datasets represent 162 sites that would be good candidates for areas that could use more in-depth monitoring (Figure 13).

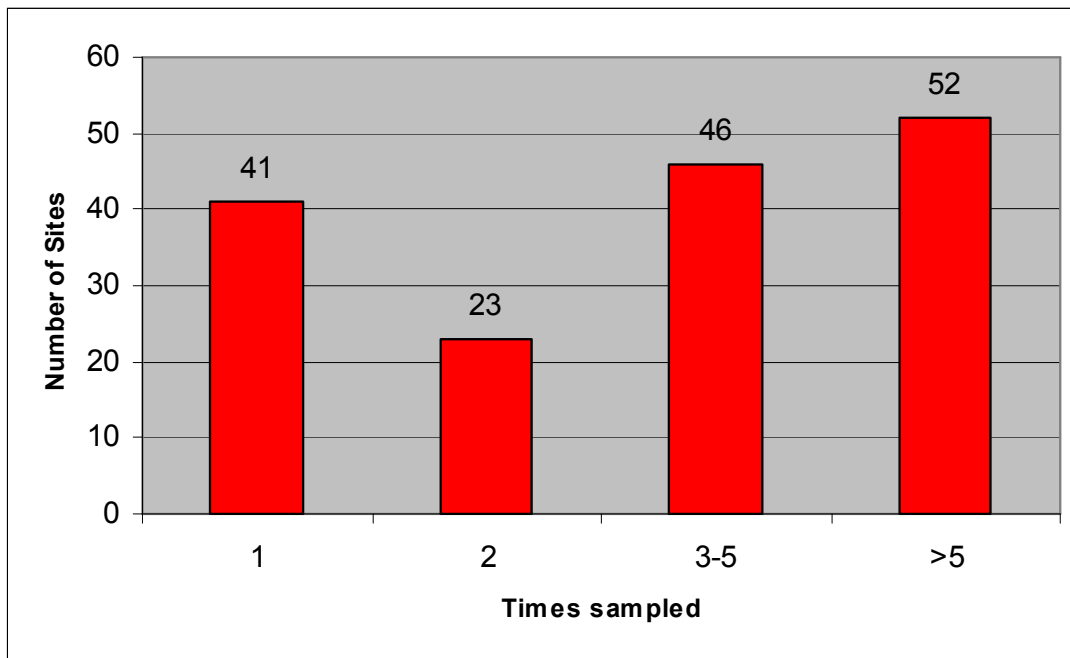
Figure 13. IOWATER sites without benthic macroinvertebrates in at least one biological assessment (2000-2008)



Volunteers that provided comments about these sites most often indicated that they did not spend much time sampling, the water was higher or lower than normal, flow was blocked by obstructions, the stream was dry, water was frozen, or had poor habitat conditions. Often volunteers also made comments of other types of life in the stream such as geese, frogs, fish, and plants.

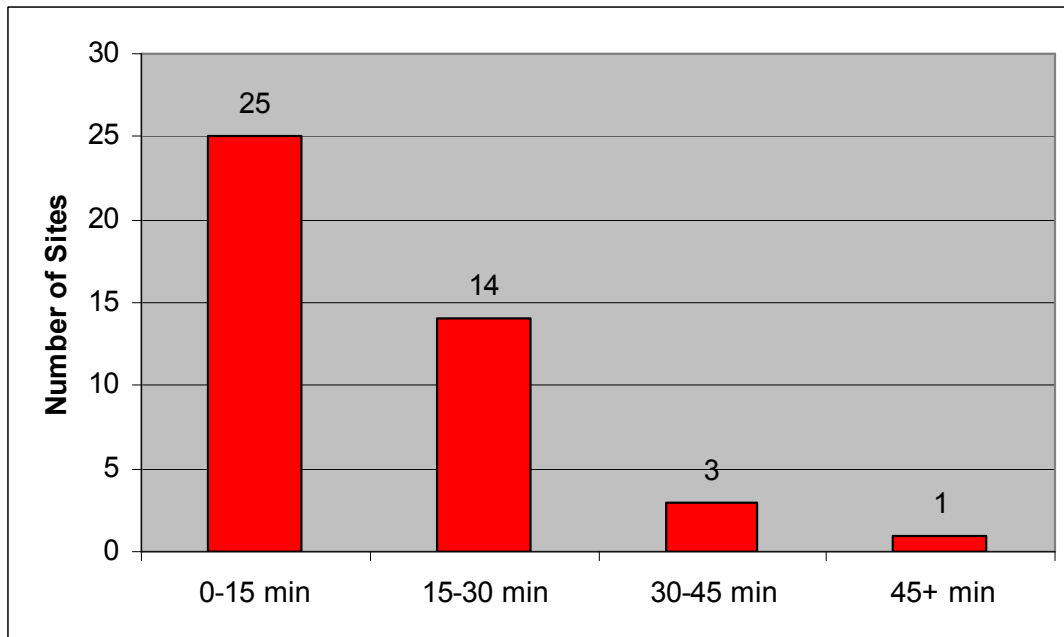
Figure 14 displays the number of times sites without benthic macroinvertebrates recorded at least once have been sampled. Most sites that were sampled more than once had low numbers of benthic macroinvertebrates and poor to fair IBI scores with the exception of 14 sites that had up to 17 benthic macroinvertebrates found and an IBI as high as 3.

Figure 14. Sampling of sites without benthic macroinvertebrates (2000-2008)



In 2006, IOWATER volunteers began submitting information regarding the amount of effort used to sample for benthic macroinvertebrates and their confidence in benthic macroinvertebrate identification with the biological assessment. Of the sites with these data only one collection net was used. There were 6 exceptions to this using 3, 4, 5 nets time each and three times using 6+ nets. The majority of sites were sampled for 0-30 minutes (Figure 15); however one site was sampled for 45+ minutes using 3 nets and two sites were sampled for 30-45 minutes each with 4 and 6+ nets.

Figure 15. Length of time sites without benthic macroinvertebrates were sampled (2006-2008)



At sites without benthic macroinvertebrates, run habitats were most often sampled; however volunteers also sampled riffles and pools (Figure 16). In 2006, IOWATER volunteers started to submit additional habitat data

with the biological assessment. For sites with these data, microhabitats were also not recorded at the majority of sites without benthic macroinvertebrates (Figure 17). The most common microhabitat types sampled were mud & silt, sand, leaf packs, logjams, rock piles, weed beds, fallen trees, cut banks, and overhanging vegetation (Figure 18).

Figure 16. Habitat sampling of sites with without benthic macroinvertebrates (2000-2008)

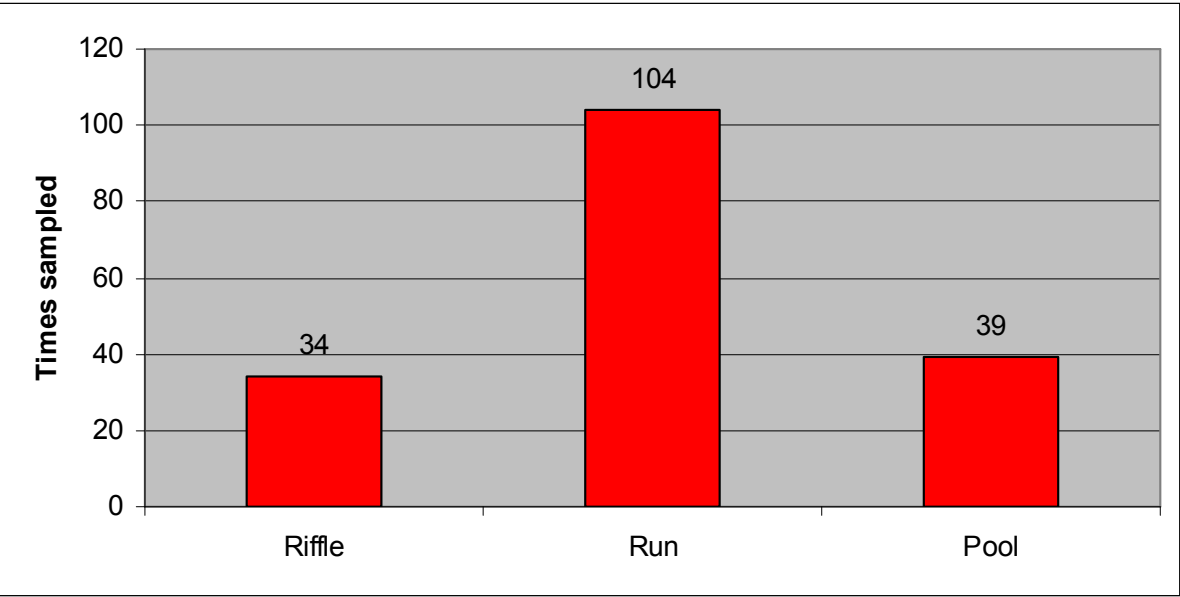


Figure 17. Number of microhabitats that were sampled at sites without benthic macroinvertebrates (2006-2008)

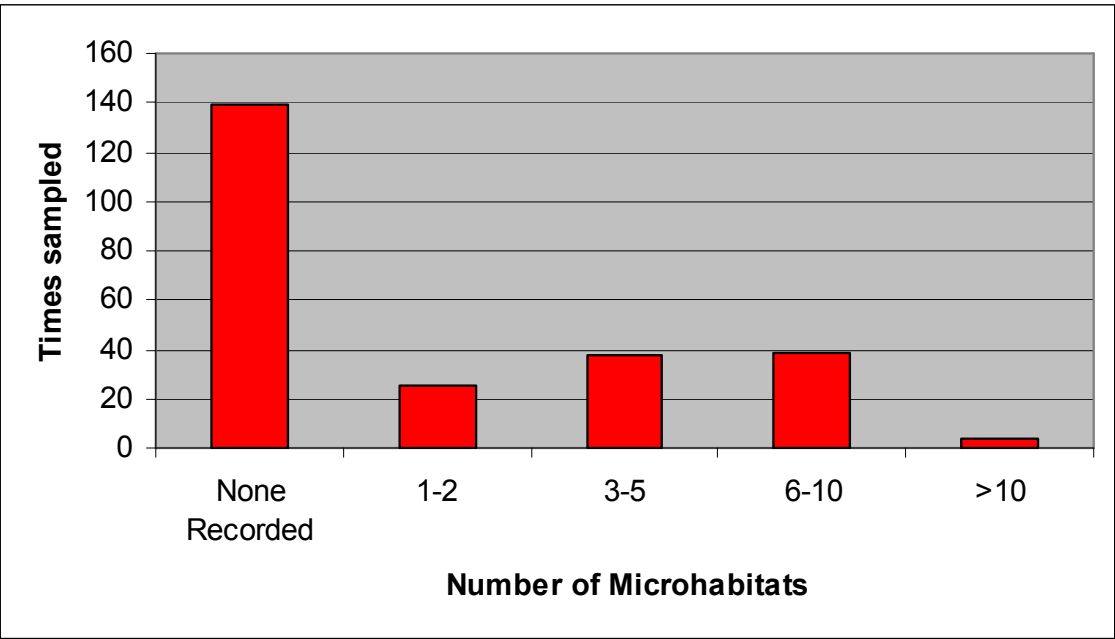
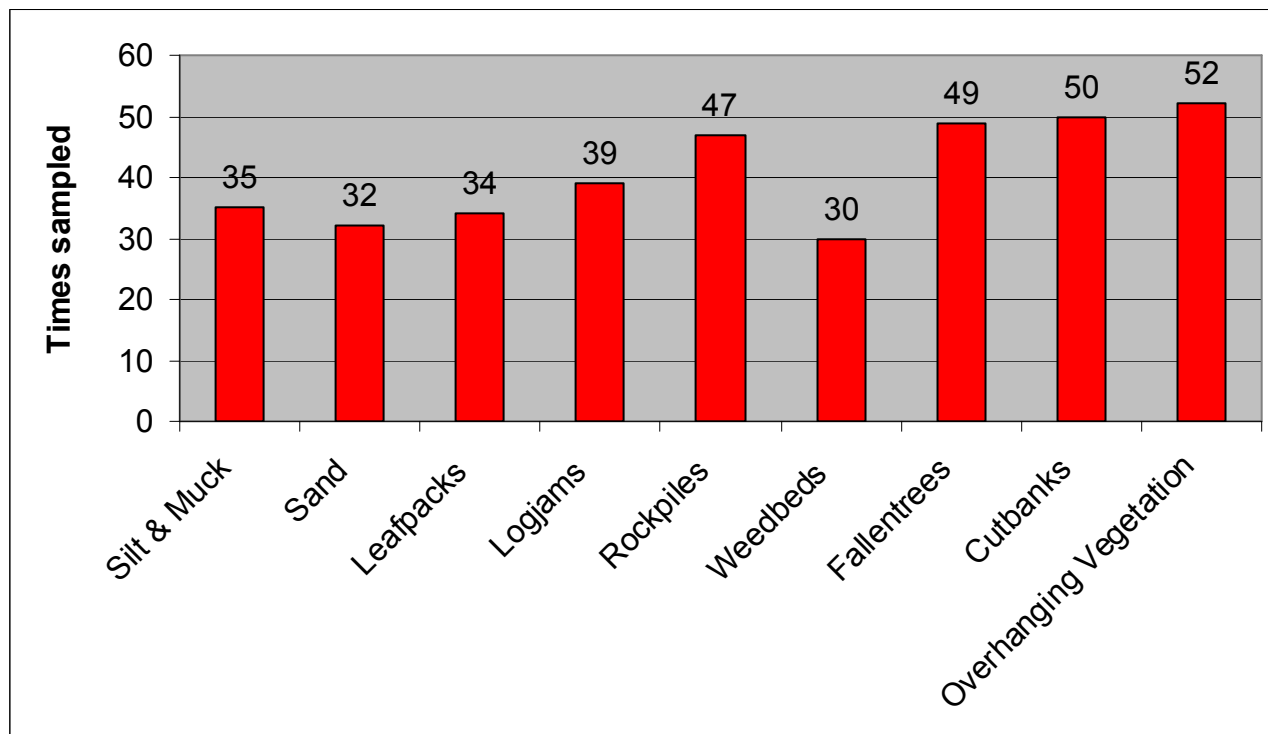


Figure 18. Number of times the most common microhabitats were sampled at sites without benthic macroinvertebrates (2006-2008)



Stonefly Populations

Stoneflies are generally considered to be intolerant of pollution. In other words, if pollution is present, these are usually some of the first organisms to disappear. Their disappearance could also indicate other conditions such as poor habitat quality. There were 622 biological assessments at 342 sites that recorded stoneflies as being present from 2000-2008 (Figure 19). At sites with stoneflies, volunteers indicated the presence of many benthic macroinvertebrates. Most commonly recorded were caddisfly, crawdad, damselfly, dragonfly, water strider, and pouch snail (Figure 20). The lowest IBI score for an assessment with stoneflies recorded was 1.67 and the highest score was 3. Of assessments with stoneflies, 73.6% had an IBI ranking of good and 26.4% had an IBI ranking of fair. Sites with multiple datasets consistently had stoneflies reported as being present.

Figure 19. IOWATER sites with stoneflies (2000-2008)

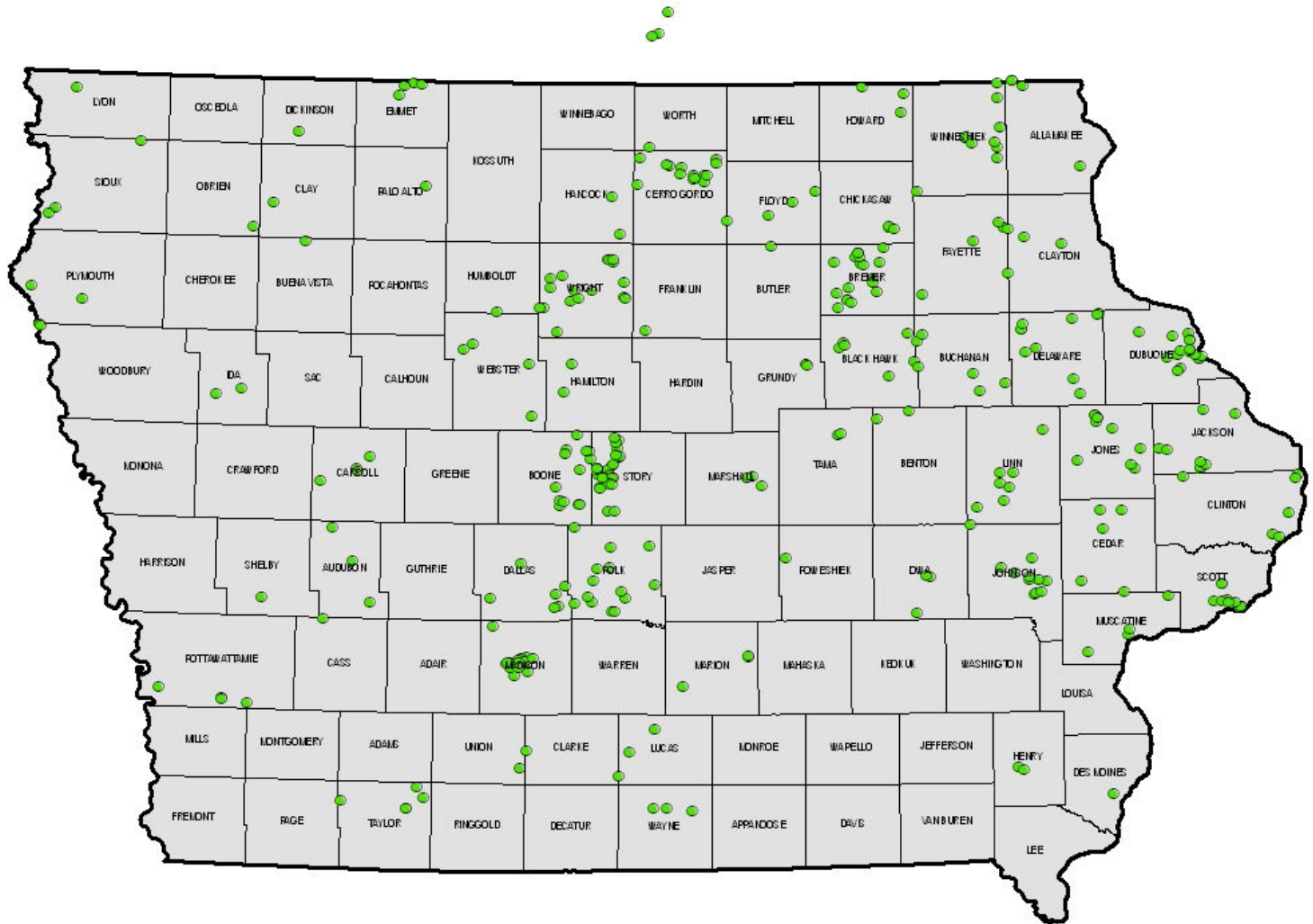
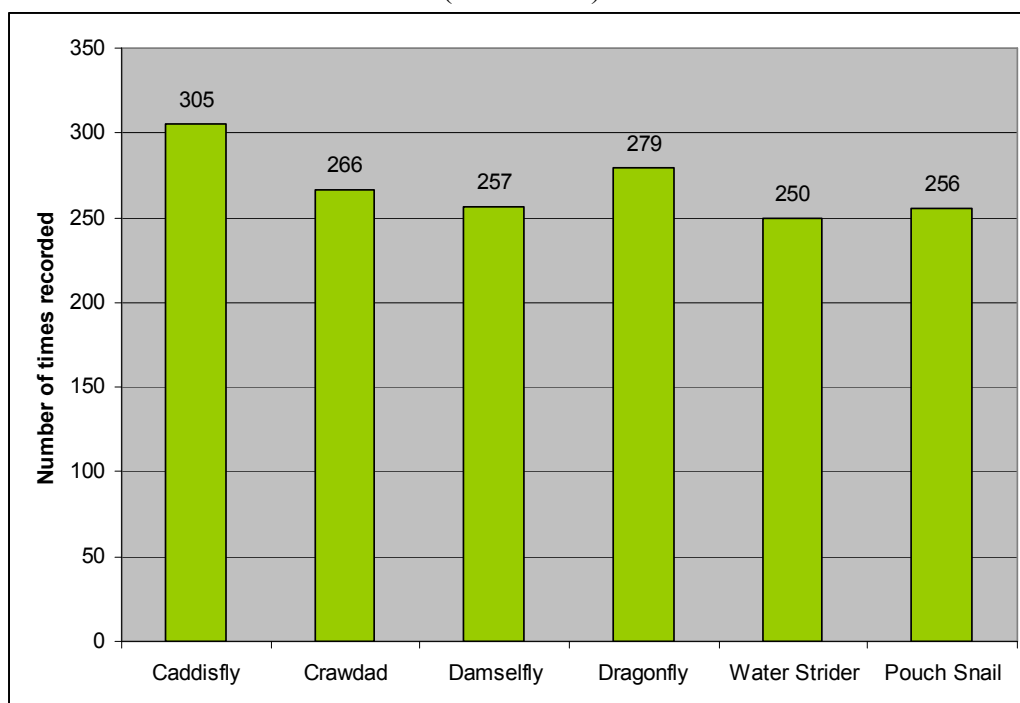


Figure 20. Number of times the most common benthic macroinvertebrates were recorded along with stoneflies (2000-2008)



At sites with stoneflies, run habitats were most often sampled; however volunteers also sampled riffles and pools (Figure 21). In 2006, IOWATER volunteers started to submit additional habitat data with the biological assessment. For sites with these data, volunteers recorded 3-5 microhabitats at the majority of sites with stoneflies (Figure 22). The most common microhabitat types sampled were mud & silt, sand, algae mats, leaf packs, logjams, rock piles, rootwads, weed beds, fallen trees, cut banks, and overhanging vegetation (Figure 23).

Figure 21. Habitat sampling of sites with stoneflies (2000-2008)

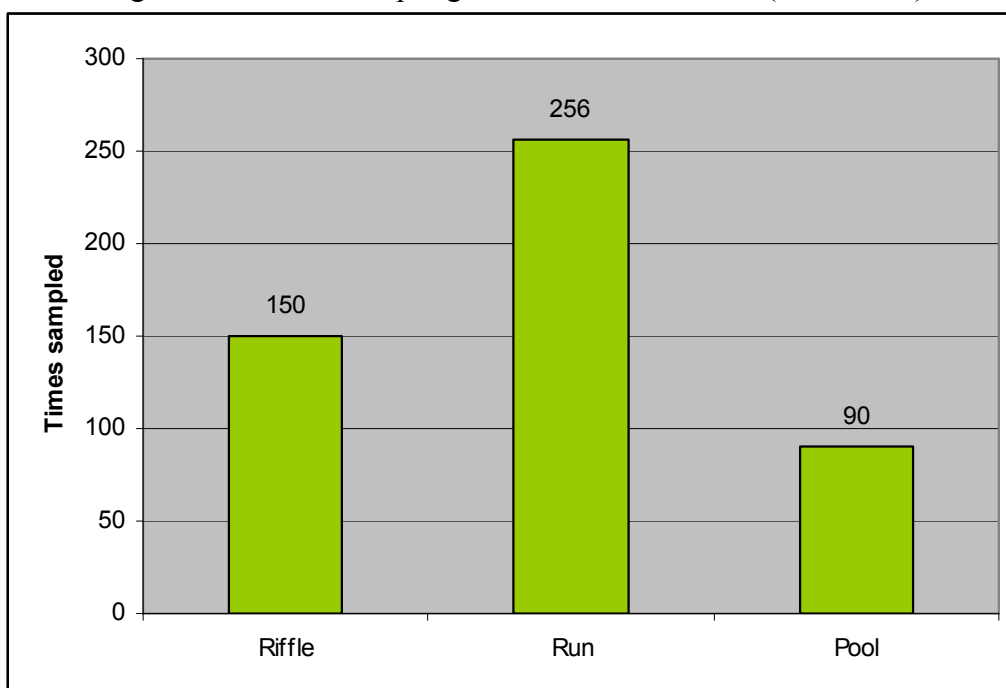


Figure 22. Number of microhabitats that were sampled at sites with stoneflies (2006-2008)

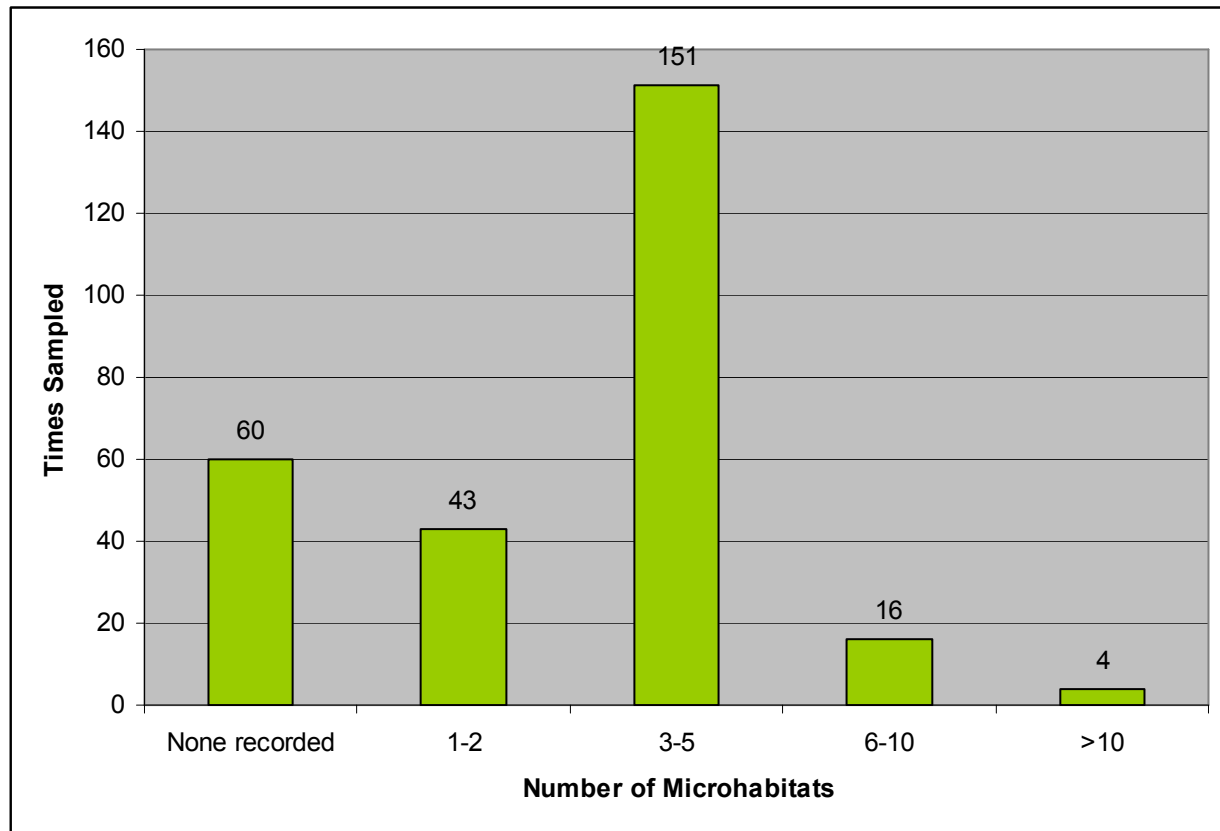
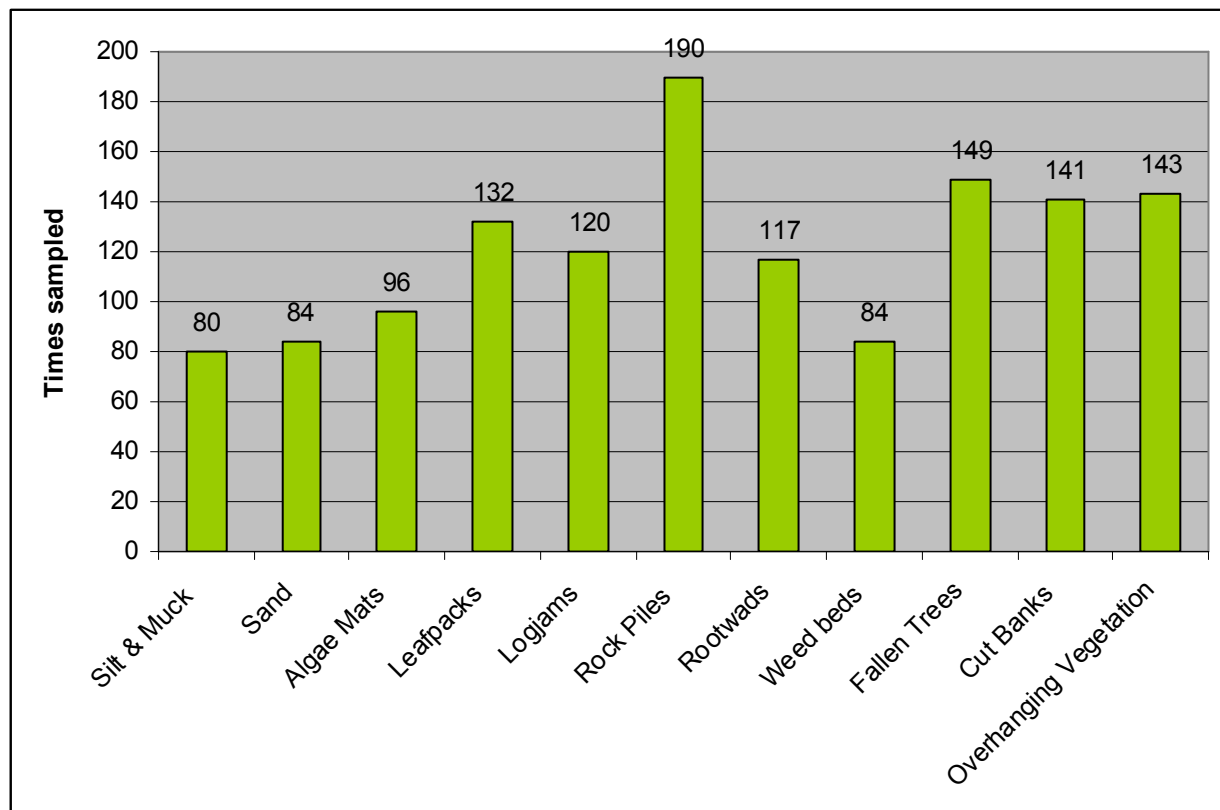


Figure 23. Number of times the most common microhabitats were sampled at sites with stoneflies (2006-2008)



Summary

- From 2000-2008, 3,675 biological assessments were completed at 1,185 different sites in Iowa and Minnesota
- The most common habitat type sampled are runs and the most common microhabitat types sampled were silt & muck, sand, rock piles, root wads, fallen trees, cut banks, and overhanging vegetation.
- The benthic macroinvertebrate population statewide indicated a diverse population.
- IBI scores show that 88 sites scored in the “Poor” category (3.63%), 677 sites were in the “Fair” category (57.13%), 420 sites were in the “Good” category (35.44%) and 45 sites were in the “Not Assessed” category (3.80%).
- There were 62 sites where only low quality benthic macroinvertebrates were recorded in at least one assessment from 2000-2008.
- There were 162 sites where no benthic macroinvertebrates were recorded in at least one assessment during the time period from 2000-2008.
- There were 342 sites where stoneflies were recorded as being present in at least one assessment from 2000-2008.

References

Hilsenhoff, W. L. 1982. Using a biotic index to evaluate water quality in streams. Wisconsin Department of Natural Resources Technical Bulletin. 132:1-22.

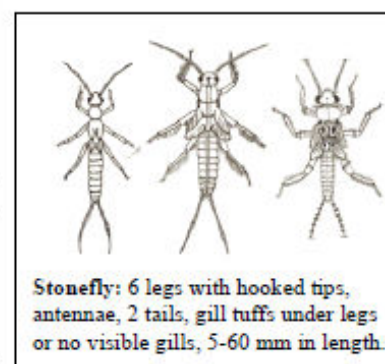
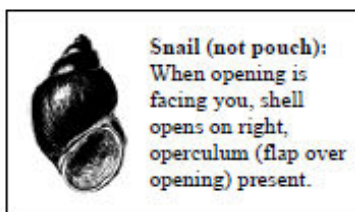
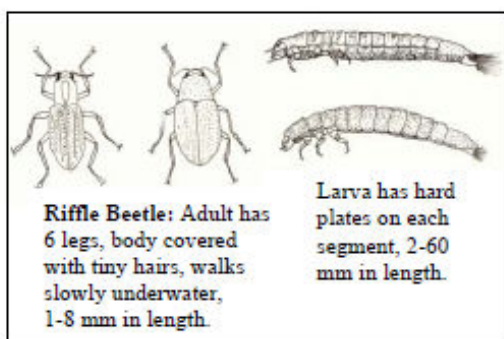
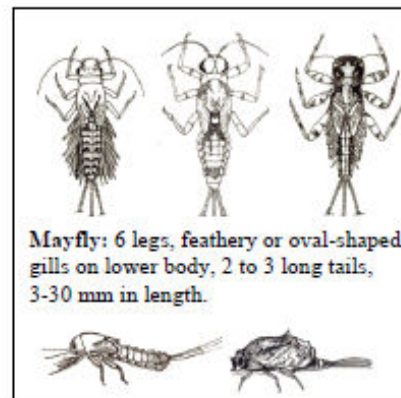
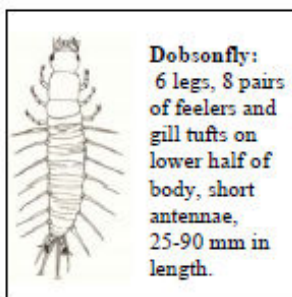
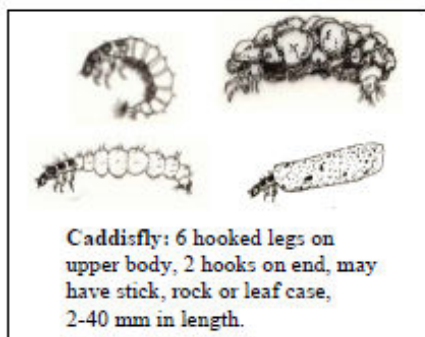
Appendix 1 – IOWATER Level 1 Benthic Macroinvertebrate Identification key



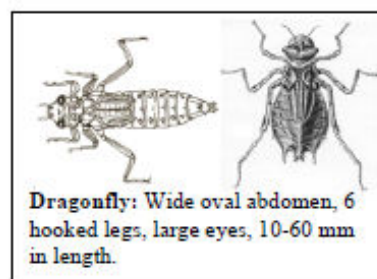
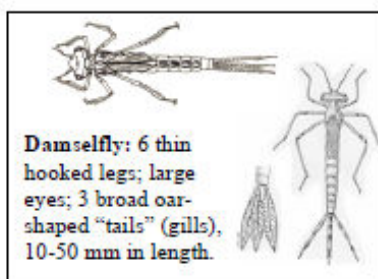
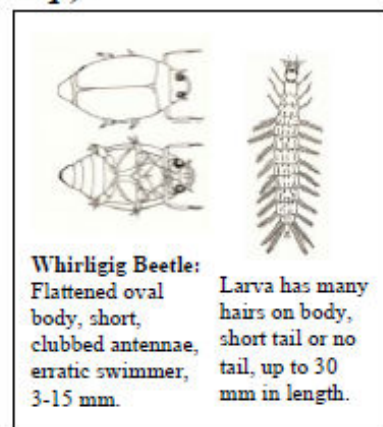
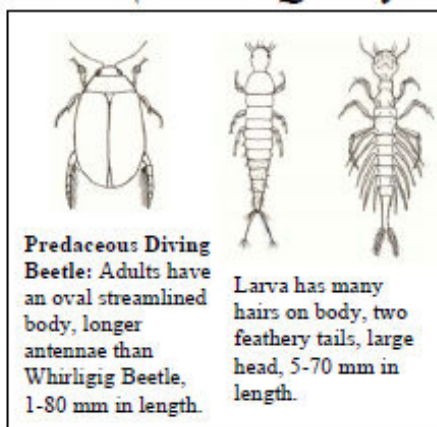
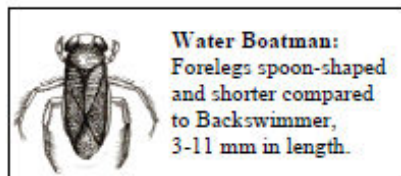
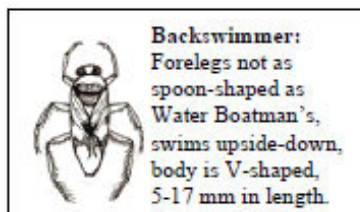
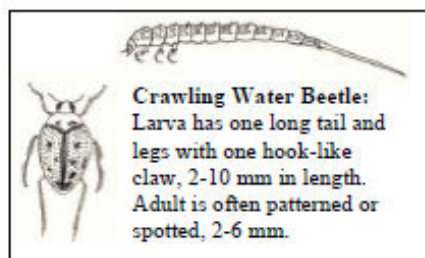
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IOWATER BENTHIC MACROINVERTEBRATE KEY

Pollution Intolerant (High Quality Group)



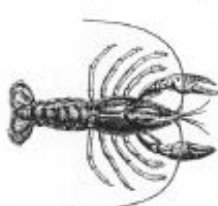
Somewhat Pollution Tolerant (Middle Quality Group)



Somewhat Pollution Tolerant (Middle Quality Group) continued



Crane Fly: Milky, green, or light brown color, caterpillar-like segmented body, 4 finger-like lobes at back end, no visible head, 10-100 mm.



Crawdad: 2 large claws, 8 legs, up to 6 inches long.



Mussels/Clams: Fleishy body enclosed between 2 clamped shells (bivalve), 2-250 mm.



Scud: White to grey, more than 6 legs, swims sideways, body higher than wide, 5-20 mm



Water Scorpion: Raptor-like forelegs for catching prey, long breathing tube, stick-like long body, 15-45 mm.



Giant Water Bug: Raptor-like forelegs for catching prey, leathery textured, oval body, 15-65 mm in length.



Sowbug: Gray body wider than it is high, more than 6 legs, 5-20 mm.



Water Strider: Slender body, long legs "walk" on water surface, 3-21 mm.

Orbsnail: One shell, coiled and flattened, a.k.a. rams-horn, 3-30 mm



Alderfly: Looks like a small Dobsonfly but has one long tail and no gill tufts, 10-25 mm.

Water Mite: 8 legs, round body, may be brightly colored, 2-3 mm



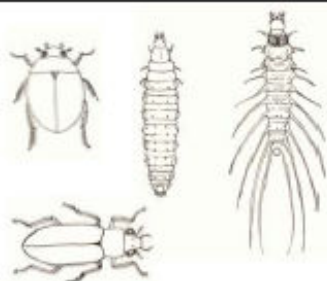
Limpet: One shell, not coiled, shaped like a flat cone 3-7 mm

Pollution Tolerant (Low Quality Group)



Mosquito: Head has small mouth brushes and short antennae; abdomen has breathing siphon, surfaces for air, 4-12 mm.

Water Scavenger Beetle: Adult may or may not be streamlined, most have no hairs on legs, short clubbed antennae, 1-40 mm. Larva have short antenna, 8 soft body segments, 4 -60 mm.



Pouch Snail: When opening is facing you, shell opens on the left, no operculum (flap over opening).

Midge Fly: Small, dark head, 2 tiny legs on each end, 2-20 mm.



Bloodworm: One type of midge fly, has a red body due to hemoglobin.

Flatworm (Planarian): Flat, soft-bodied worm with arrowhead-shaped head, 1-30 mm in length.

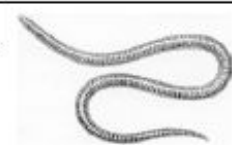


Black Fly: One end of body wider, black head and suction pad on other end, 3-12 mm.



Leech: Brown, slimy body, suction pads on body, 5-400 mm.

Rat-tailed Maggot: Worm-like, soft-bodied with long breathing tube, semi-transparent skin, 4-70 mm.



Aquatic Worm: Thin, worm-like, 0.5-700 mm.



Appendix 2 – IOWATER Level 1 Biological Assessment Field Form



Biological Assessment

* Recommended frequency – no more than three times a year (Spring, Summer, and Fall) *

Date _____ Time _____

IOWATER Monitor _____ # of Adults (incl. you) _____

Site Number _____ # of under 18 _____

Other Volunteers Involved _____

Was the stream dry when it was monitored? Yes _____ No _____

Benthic Macroinvertebrates (check all found)

____ Were Benthic Macroinvertebrates Found? (If yes, please check those benthics found. If no, please provide any relevant comments in the "Other Assessment Observations and Notes" section at the end of this form – why do you think critters are not present here?)

High Quality Group (pollution intolerant)

____ Caddisfly
____ Dobsonfly
____ Mayfly
____ Riffle Beetle
____ Snail (not pouch)
____ Stonefly
____ Water Penny Beetle

Middle Quality Group (somewhat pollution tolerant)

____ Alderfly
____ Backswimmer
____ Crane Fly
____ Crawdad
____ Crawling Water Beetle
____ Damselfly
____ Dragonfly
____ Giant Water Bug
____ Limpet
____ Mussels/Clams
____ Orbsnail
____ Predaceous Diving Beetle
____ Scud
____ Sowbug
____ Water Boatman
____ Water Mite
____ Water Scorpion
____ Water Strider
____ Whirligig Beetle

Low Quality Group (pollution tolerant)

____ Aquatic Worm
____ Black Fly
____ Bloodworm
____ Flatworm
____ Leech
____ Midge Fly
____ Mosquito
____ Pouch Snail
____ Rat-tailed Maggot
____ Water Scavenger Beetle

____ Other _____ (no tolerance group assigned)

(Over)

Revised November 2006

Benthic Macroinvertebrate Collection Time *(check one)*

0-15 min. _____ 15-30 min. _____ 30-45 min. _____ More than 45 min. _____

Collection Nets *(How many nets are you using to collect critters?)*

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6+ _____

Identification Confidence Level *(Are you confident that your identification is correct?)*

_____ I'm not sure

_____ I think they've been identified correctly

_____ Some are definitely correct, I'm not sure about others *(Please clarify in "Other Assessment Observations and Notes" section at the end of this form)*

_____ I'm fairly confident they've all been correctly identified

_____ I guarantee they have been identified correctly

Stream Reach Length *(How far along the stream did you search?)*

_____ 0-25 meters _____ 25-50 meters _____ 50-75 meters _____ 75-100 meters _____ 100+ meters _____

Microhabitats *(check all present in stream reach, check if sampled)*

Algae Mats	Present _____	Sampled _____	Leaf Packs	Present _____	Sampled _____
Logjams	Present _____	Sampled _____	Rocks	Present _____	Sampled _____
Root Wads	Present _____	Sampled _____	Weed Beds	Present _____	Sampled _____
Fallen Trees	Present _____	Sampled _____	Undercut Banks	Present _____	Sampled _____
Silt/Muck	Present _____	Sampled _____	Rip Rap	Present _____	Sampled _____
Sand	Present _____	Sampled _____	Overhanging Vegetation	Present _____	Sampled _____
Junk <i>(tires, garbage, etc.)</i> Present _____ Sampled _____					
Other <i>(describe)</i> _____			Present _____ Sampled _____		

Stream Habitat Type *(check all types sampled in stream reach)*

Riffle _____ Run _____ Pool _____

Aquatic Plant Cover of Streambed *(at transect – check one)*

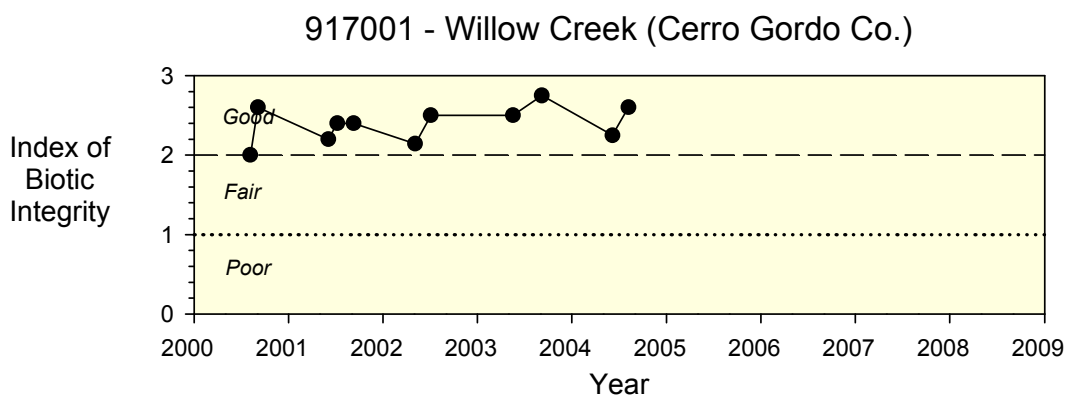
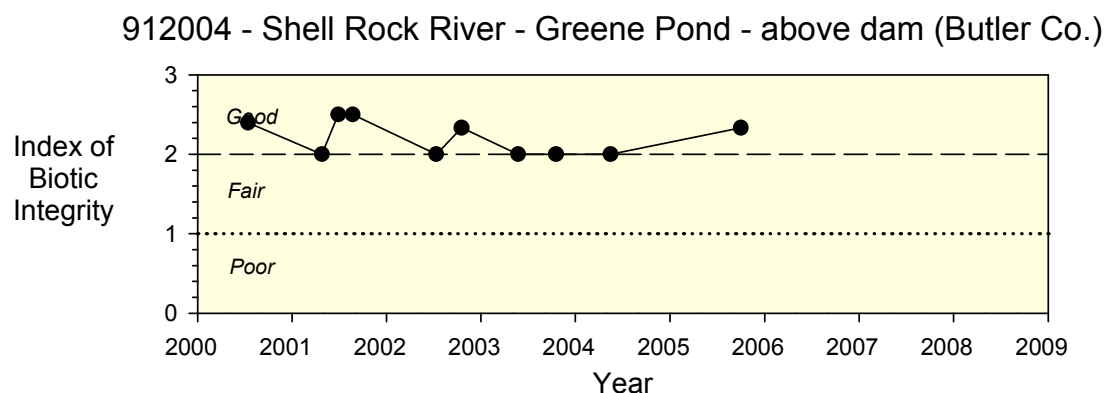
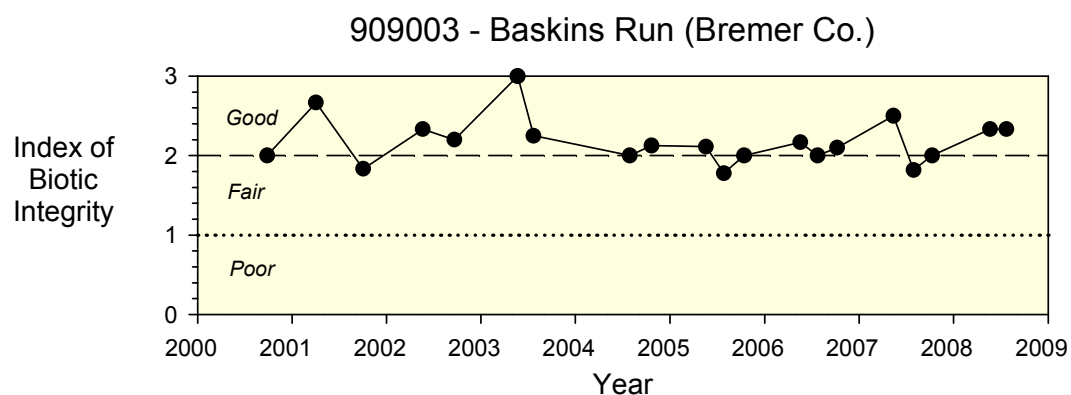
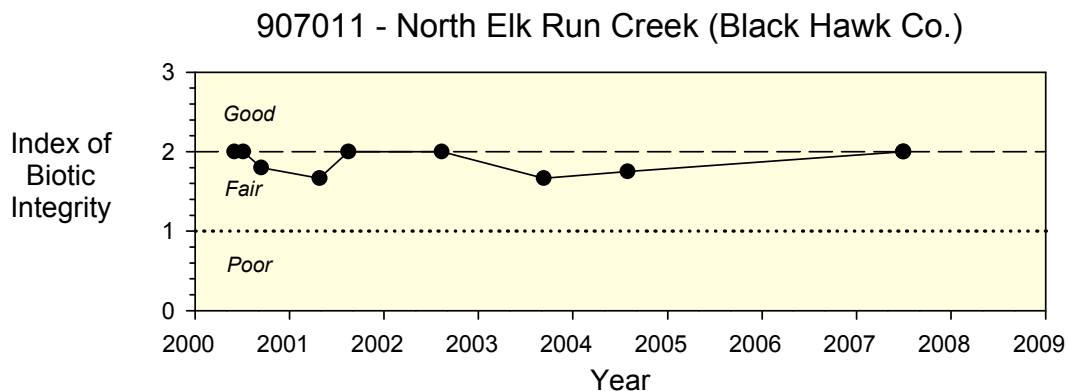
0-25% _____ 25-50% _____ 50-75% _____ 75-100% _____

Algae Cover of Stream Streambed *(at transect – check one)*

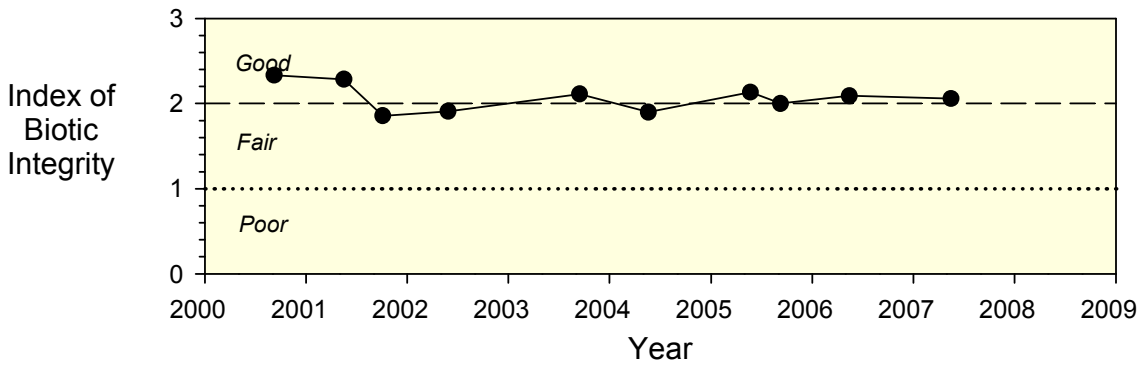
0-25% _____ 25-50% _____ 50-75% _____ 75-100% _____

Is sewage algae present in the stream?No _____ Yes _____ *If yes, please submit a photographic record.***Other Assessment Observations and Notes**

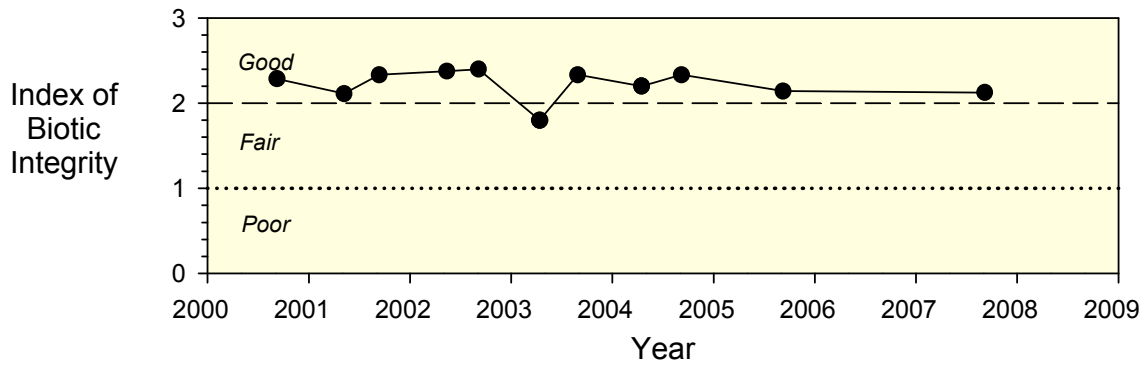
Appendix 3 - Time Series Graphs for Sites with 10 or More Biological Records. Sites are listed numerically by site number.



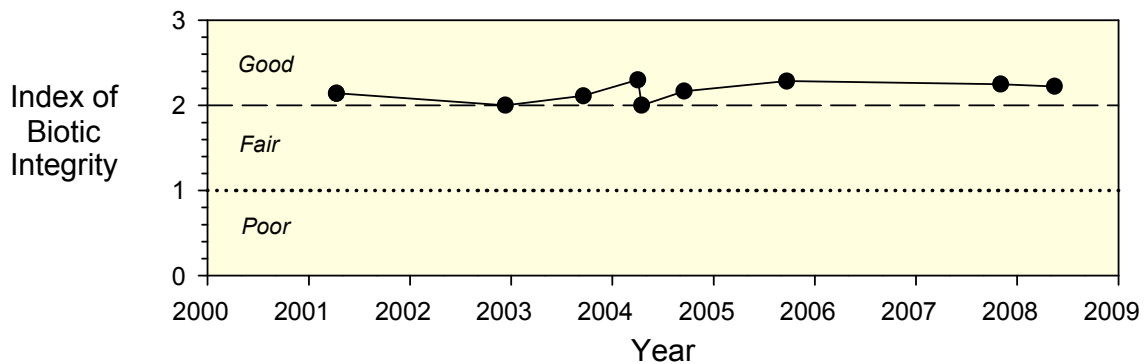
923001 - Schramling Creek (Clinton Co.)



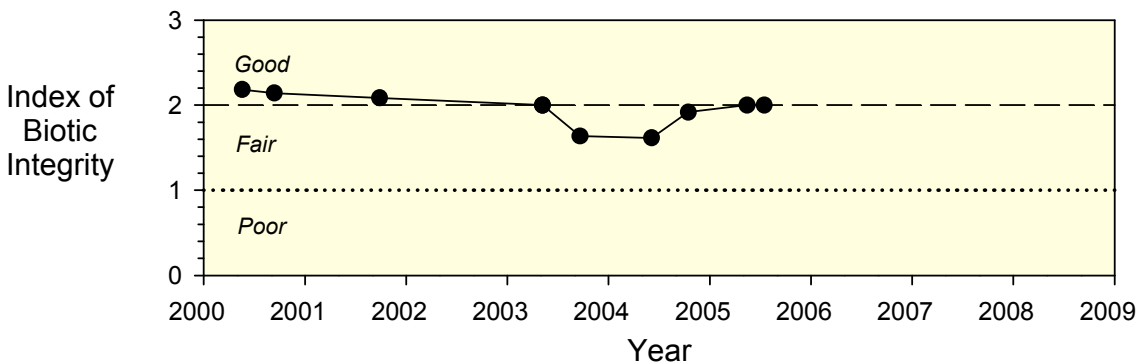
923002 - Prairie Creek 110th St (Clinton Co.)



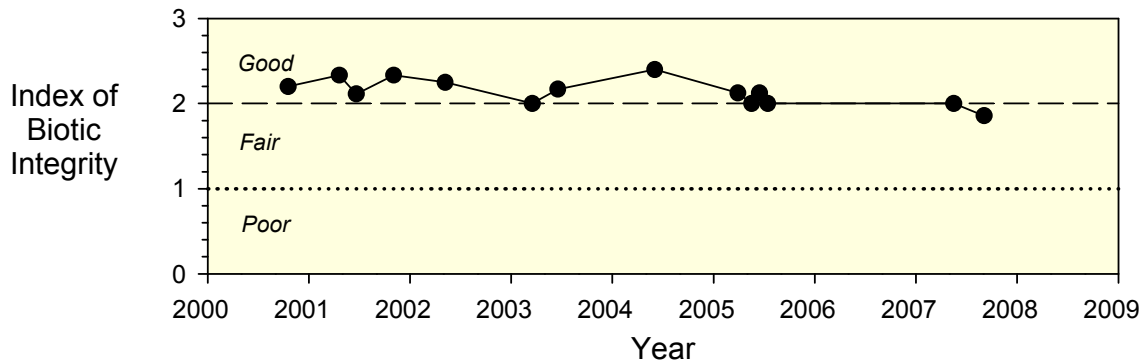
928017 - Maquoketa River (Delaware Co.)



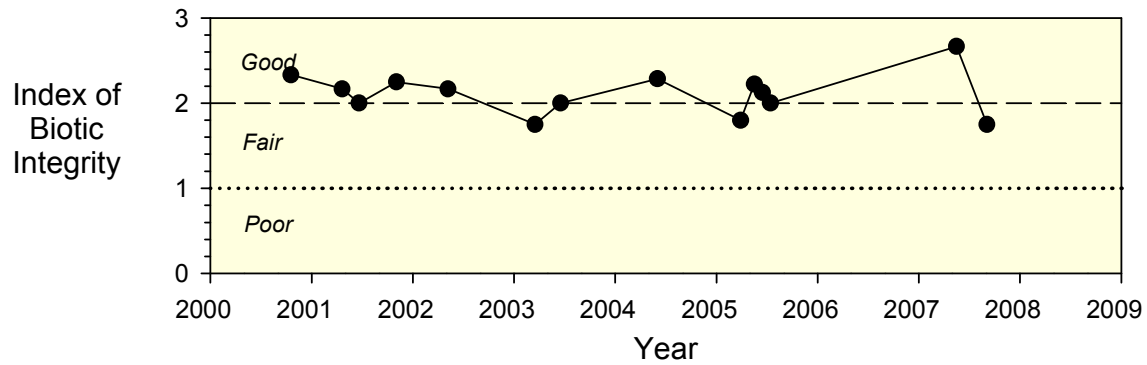
931002 - Catfish Creek Granger - upstream of bridge (Dubuque Co.)



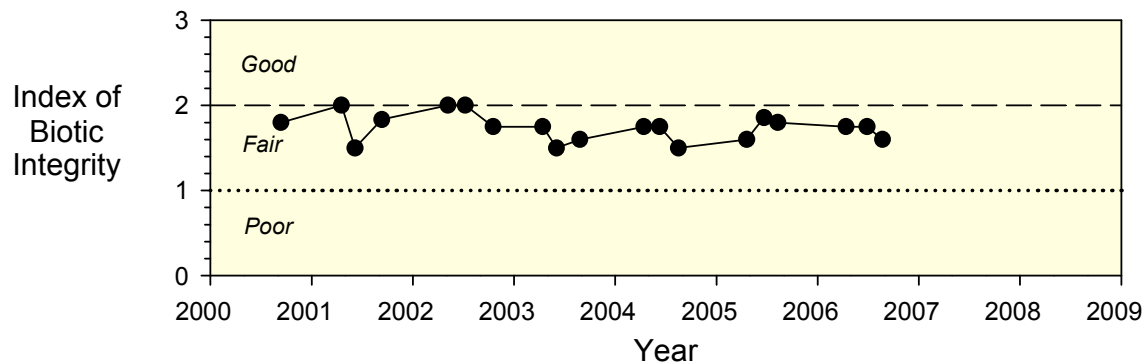
931004 - Catfish Creek South Fork - Hwy 20 (Dubuque Co.)



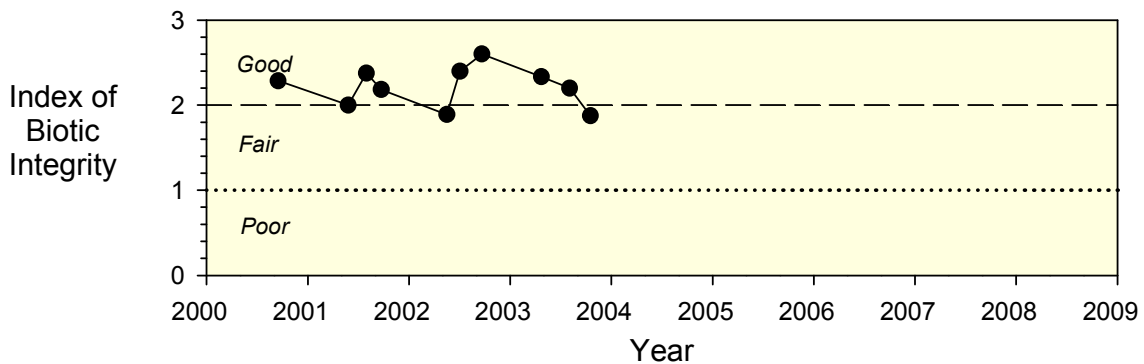
931005 - Catfish Creek Middle Fork - Old Hwy Rd (Dubuque Co.)



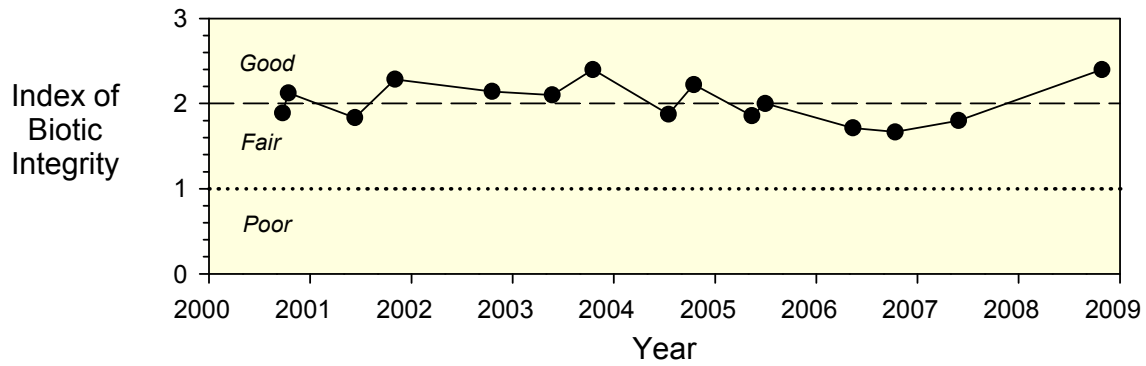
931007 - Catfish Creek North Fork - Univ. Ave. (Dubuque Co.)



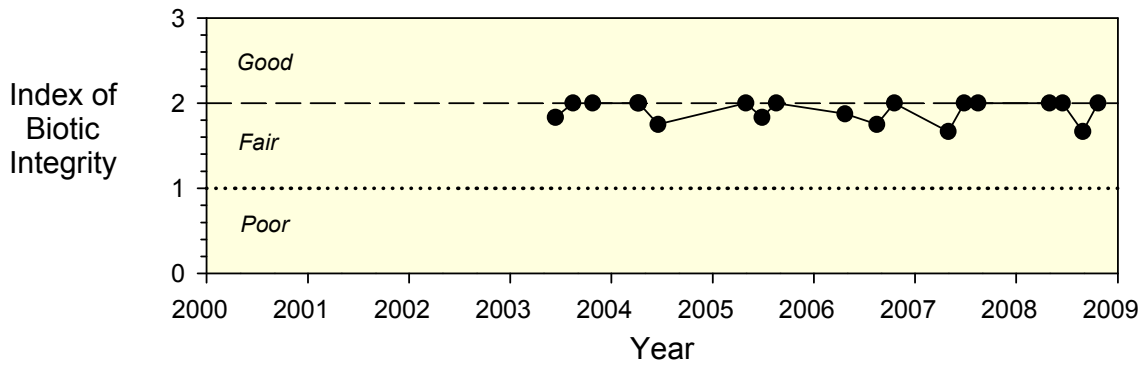
931009 - Catfish Creek Middle Fork - Upstream of N.Fork of Catfish Creek (Dubuque Co.)



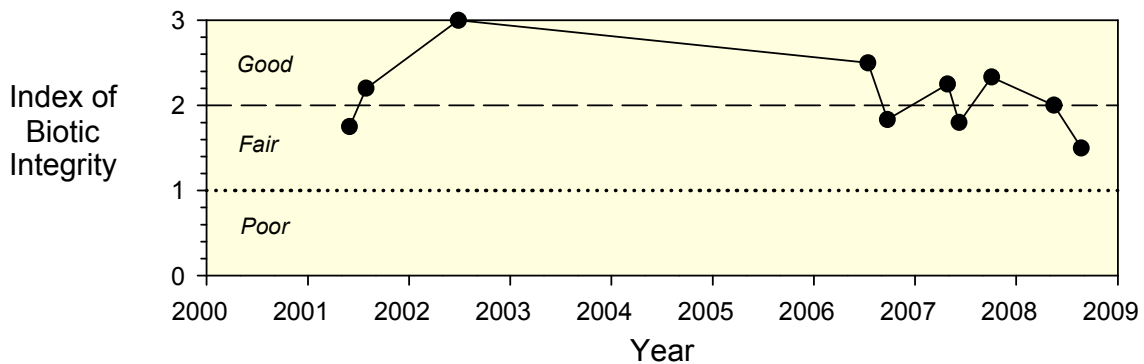
931010 - Catfish Creek Middle Fork - Southern Ave. (Dubuque Co.)



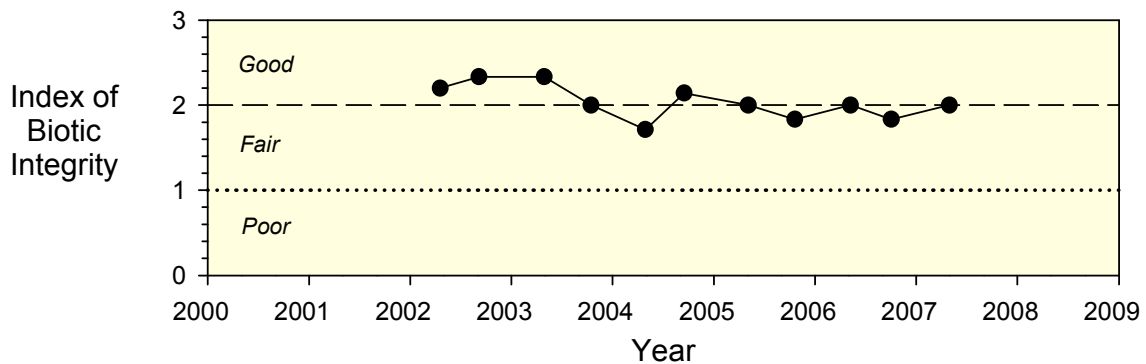
931021 - Main Fork Catfish Creek - below Granger Creek (Dubuque Co.)



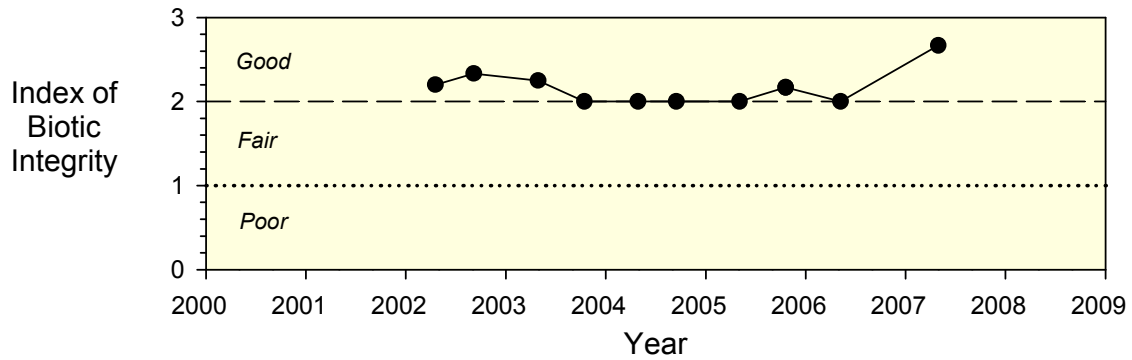
932008 - Soldier Creek (Emmet Co.)



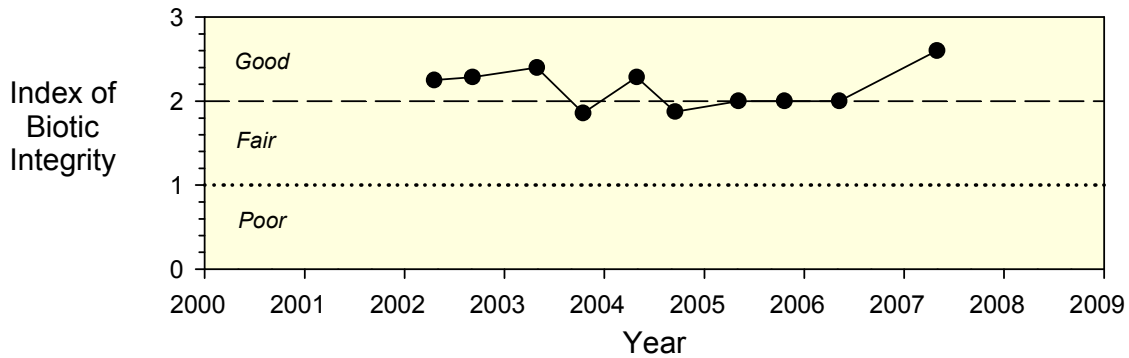
938007 - Elmwood Cemetery Site #1 (Grundy Co.)



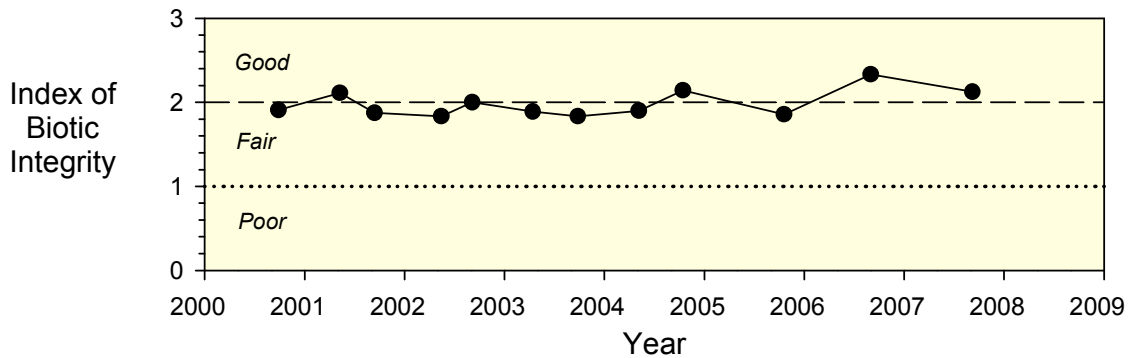
938008 - North Black Hawk Creek - Rat Park Site #2 (Grundy Co.)



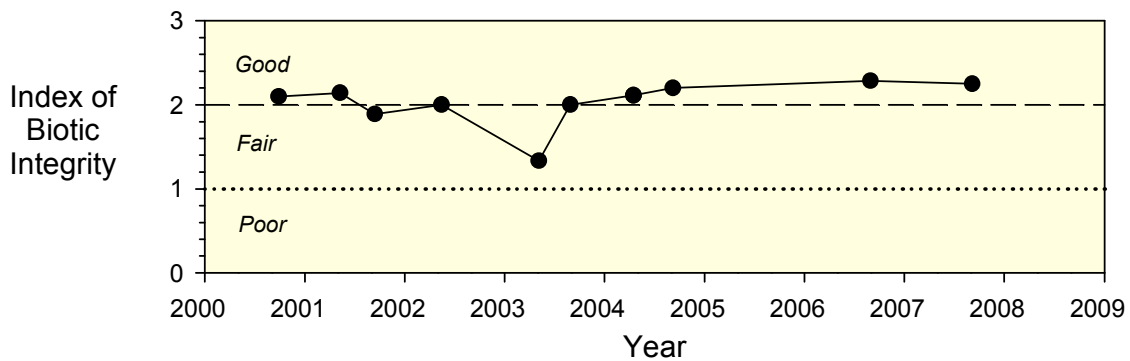
938009 - North Black Hawk Creek - 7th St Site 3 (Grundy Co.)



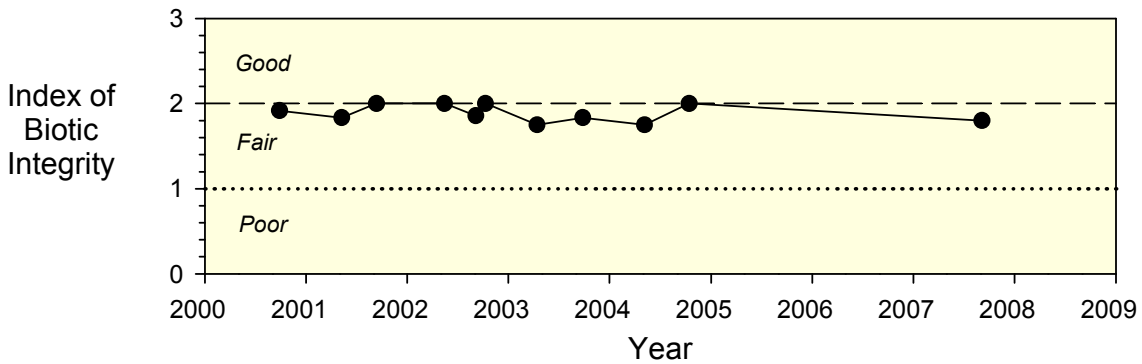
949004 - Prairie Creek - Heinrich (Jackson Co.)



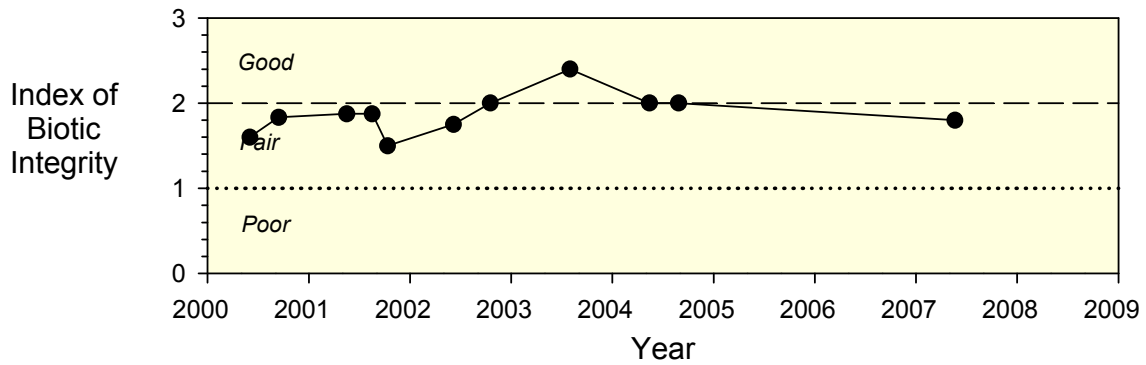
949005 - Prairie Creek - Old Hwy 61 (Jackson Co.)



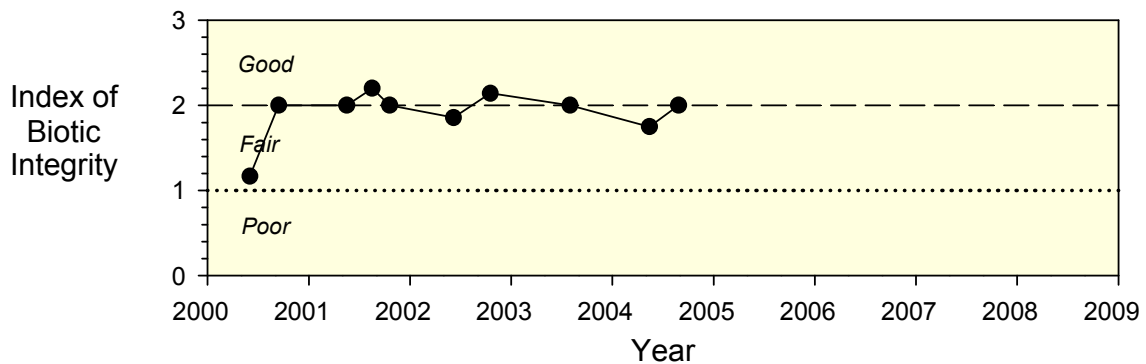
949008 - Trib to Prairie Creek (Jackson Co.)



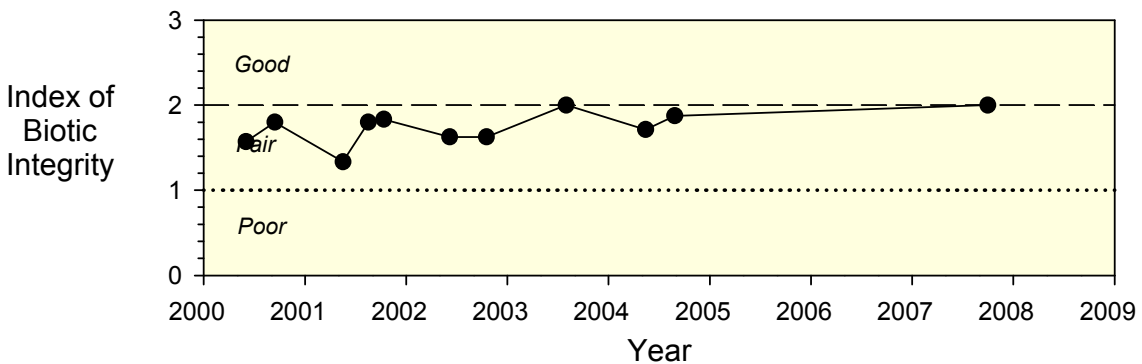
952010 - Snyder Creek - Bridge on Napoleon Rd (Johnson Co.)



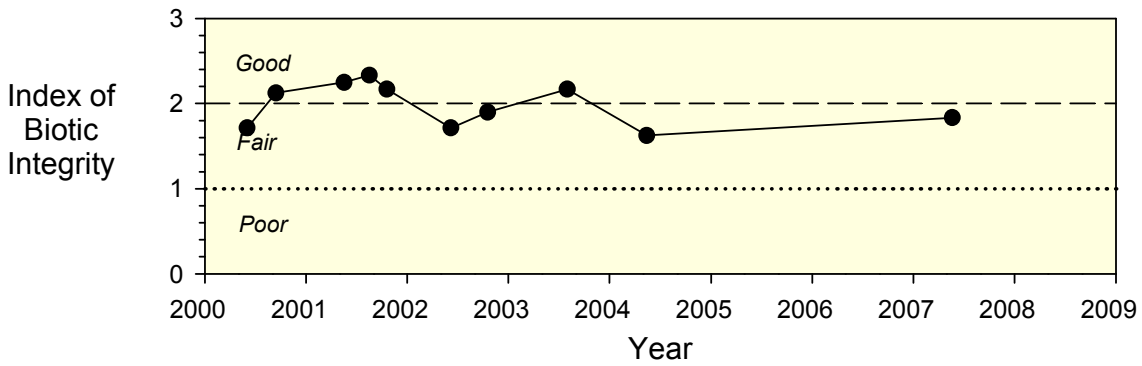
952012 - Snyder Creek - Off Tafe Ave & Hwy 6 (Johnson Co.)



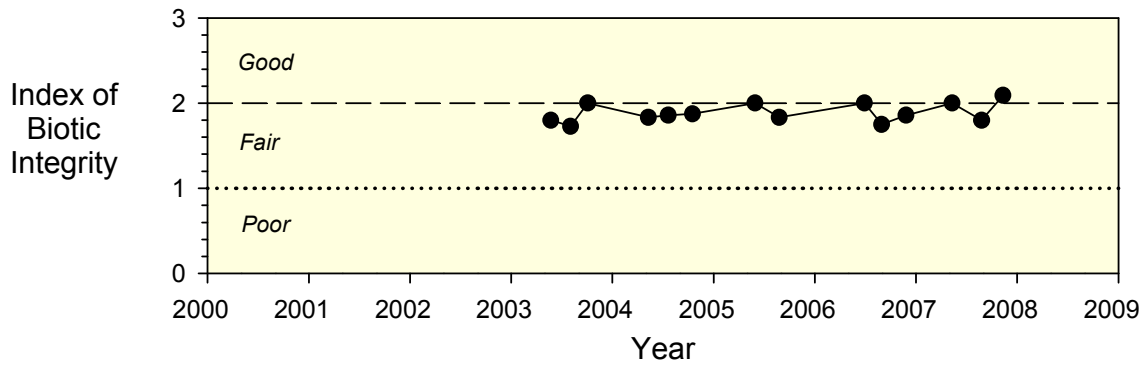
952013 - Snyder Creek - Off Hwy 6 & 420th St (Johnson Co.)



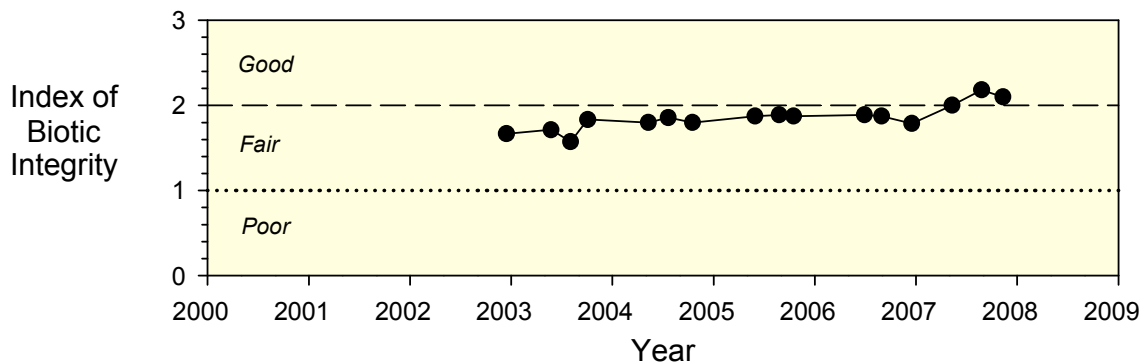
952014 - Snyder Creek - Off 420th St. & Taft Ave. (Johnson Co.)



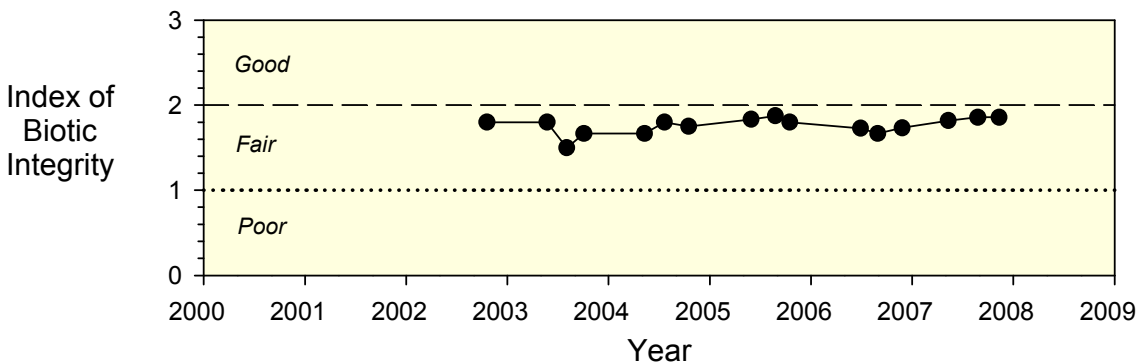
953026 - Lower Tibbets Creek (Jones Co.)



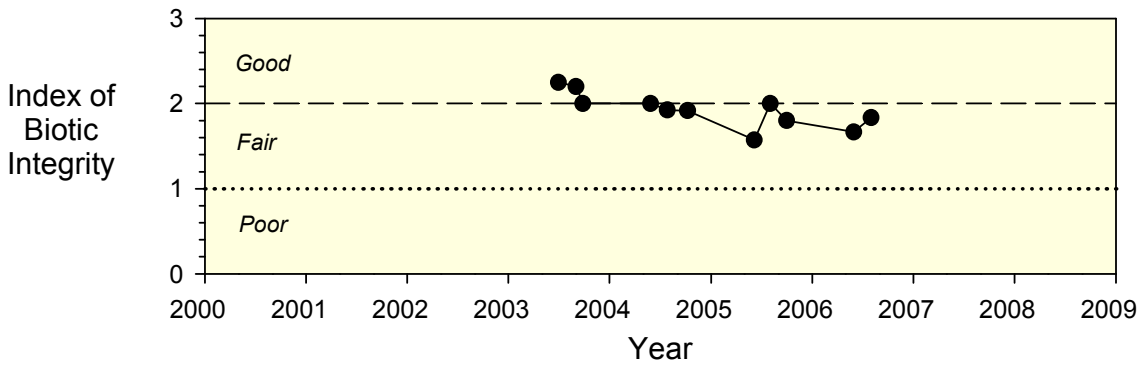
953027 - Jurdan Creek (Jones Co.)



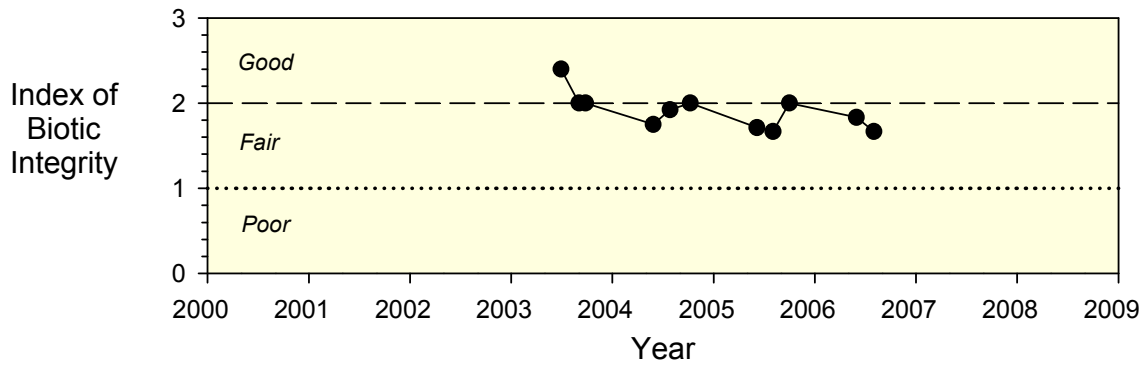
953028 - Kiva Creek (Jones Co.)



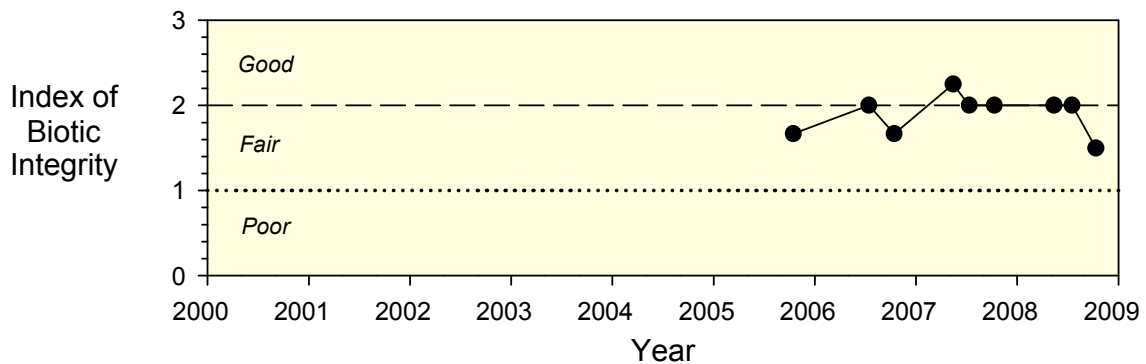
970014 - Mud Creek - Vine Ave Site 24 (Muscatine Co.)



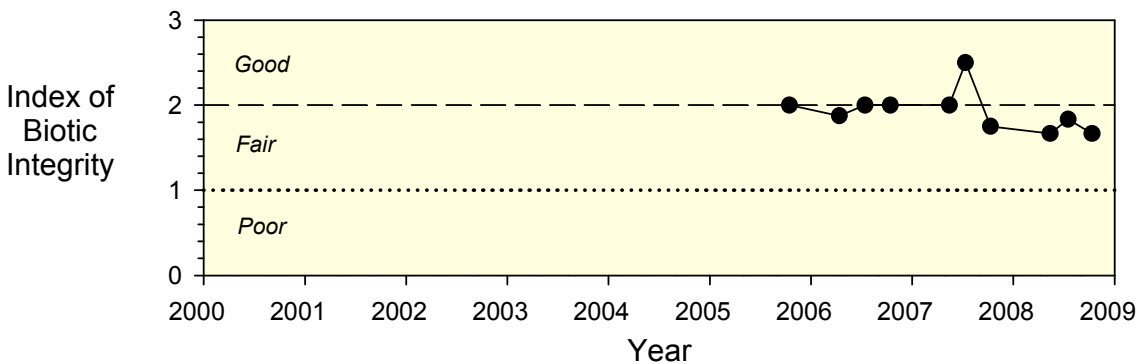
970015 - Mud Creek - Western Ave Site 25 (Muscatine Co.)



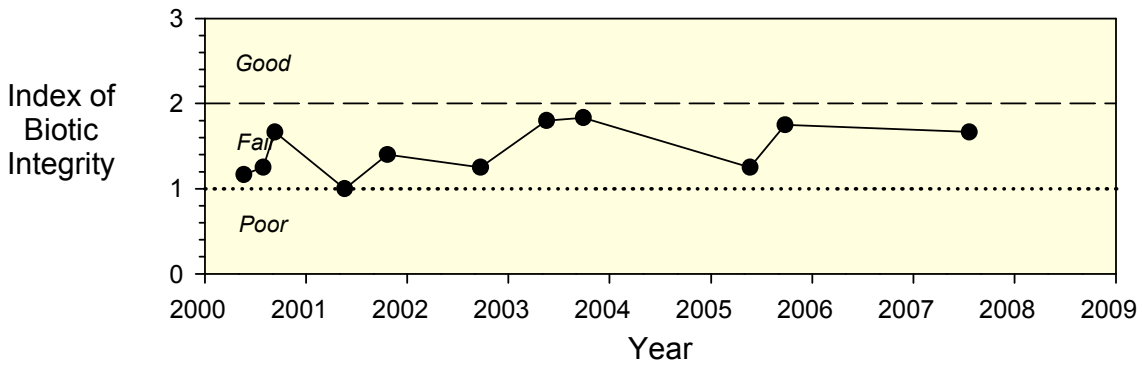
975019 - West Branch Floyd River (Plymouth Co.)



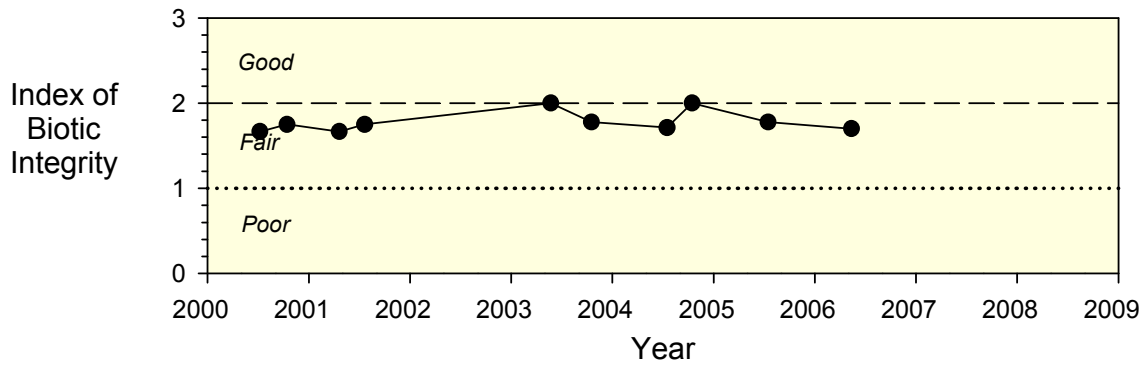
975020 - Rock Creek (Plymouth Co.)



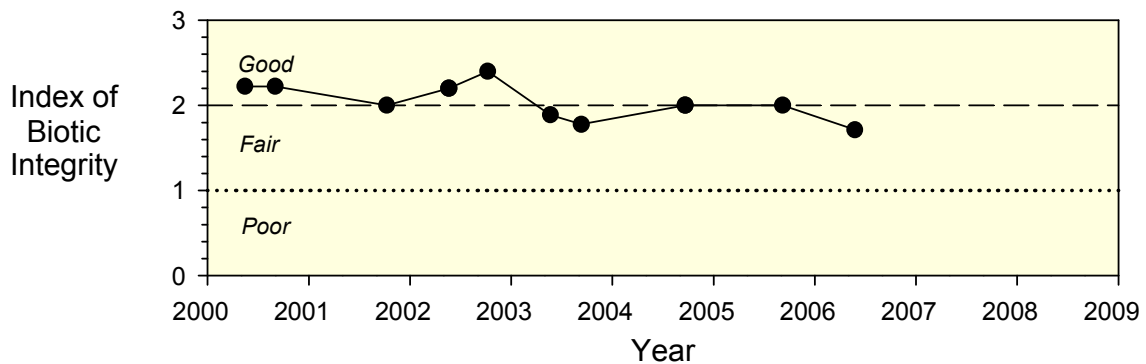
977001 - Yeader Creek (Polk Co.)



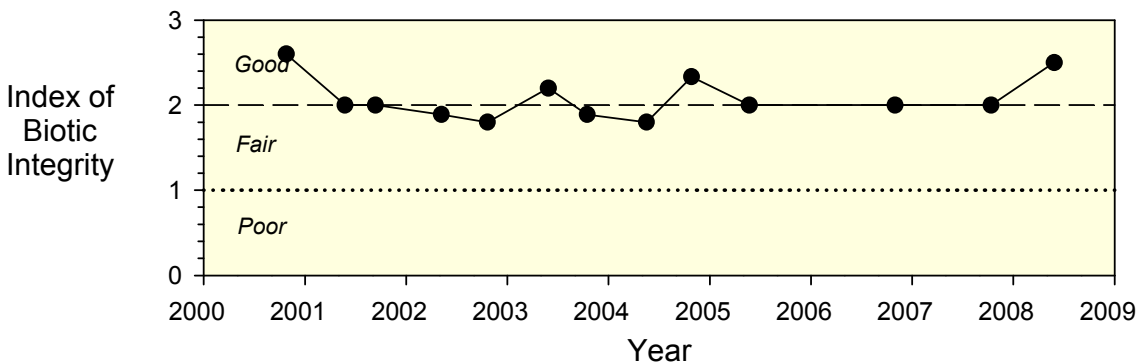
977012 - Unnamed Creek - trib to Grays Lake (Polk Co.)



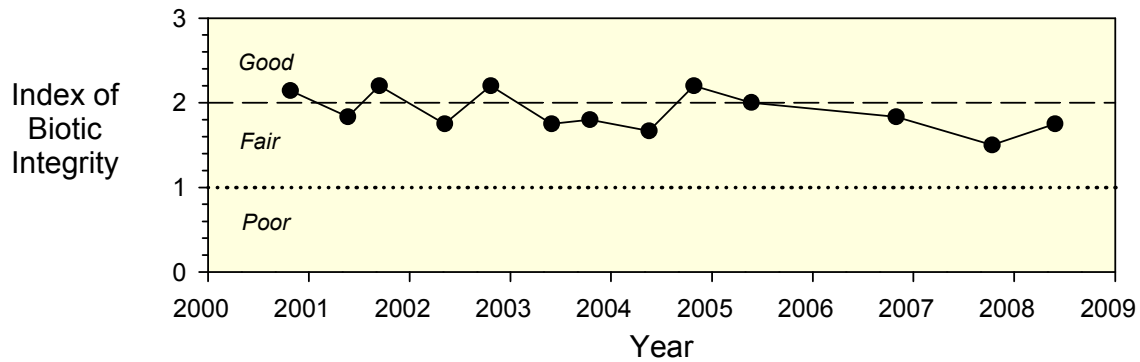
982003 - Duck Creek - Devils Glen Park (Scott Co.)



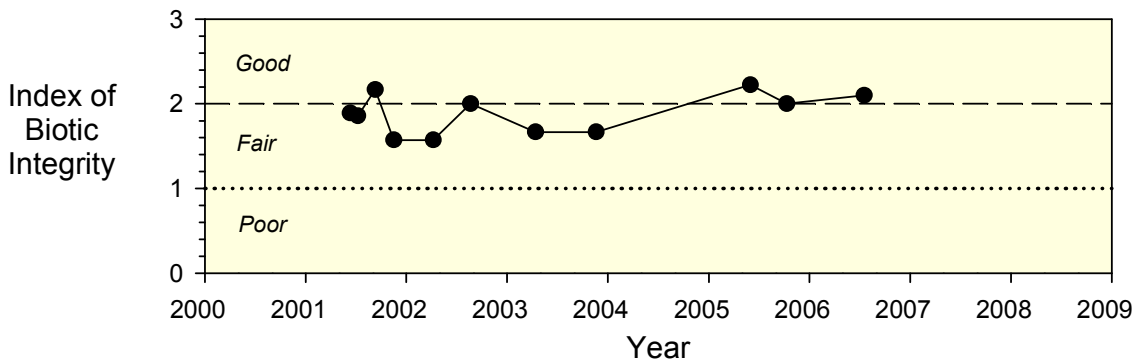
982017 - Crow Creek - South Slope 1 (Scott Co.)



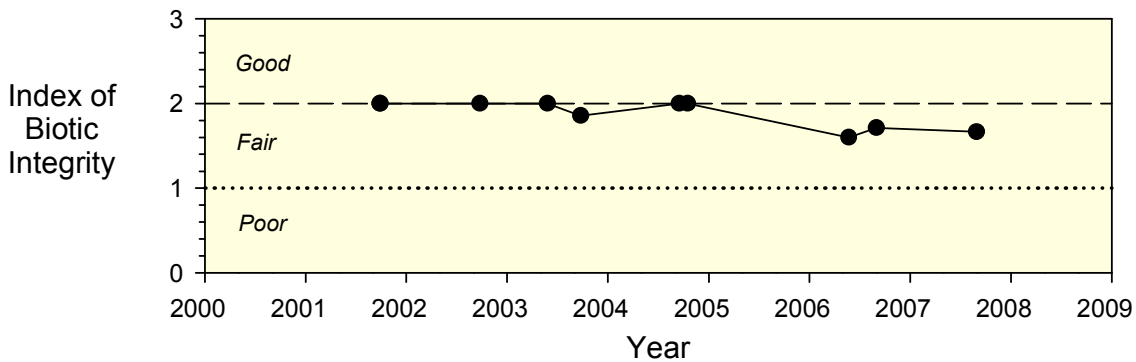
982018 - Crow Creek - South Slope 2 (Scott Co.)



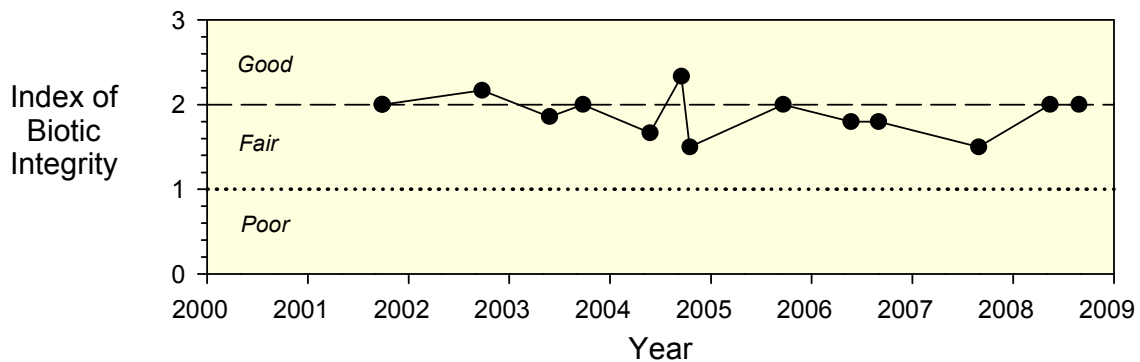
985071 - Keigley Creek at 160th St (Story Co.)



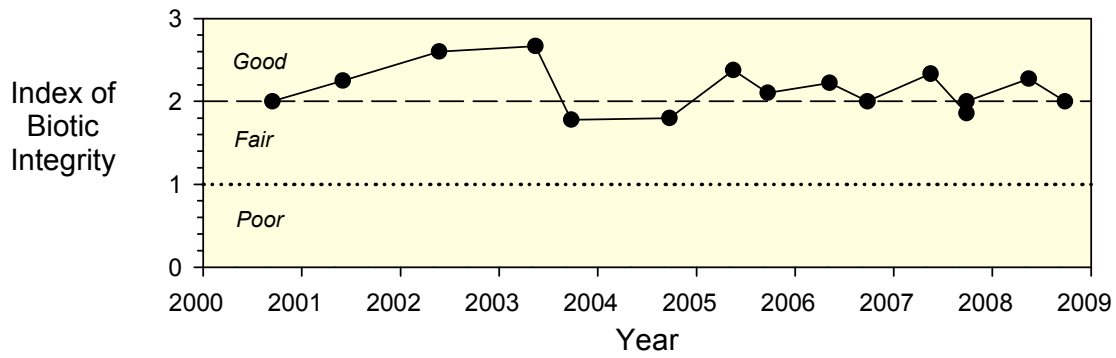
992002 - Clemons Creek near the rifle range (Washington Co.)



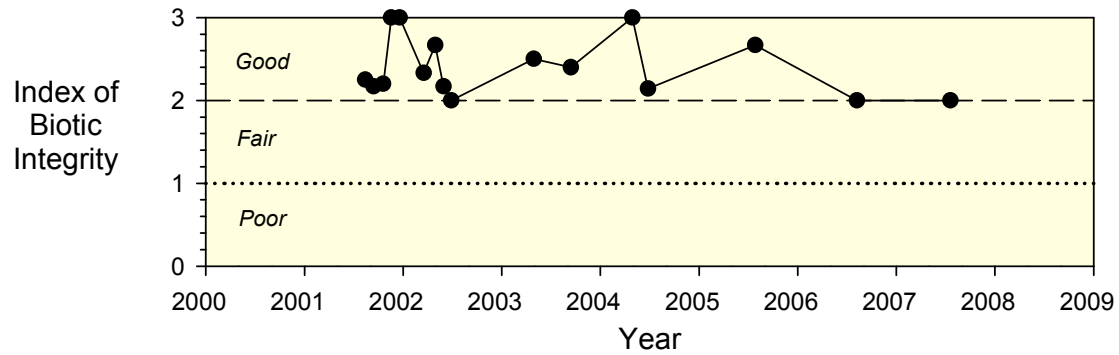
992003 - Crooked Creek near 1st bridge on Coppick Rd (Washington Co.)



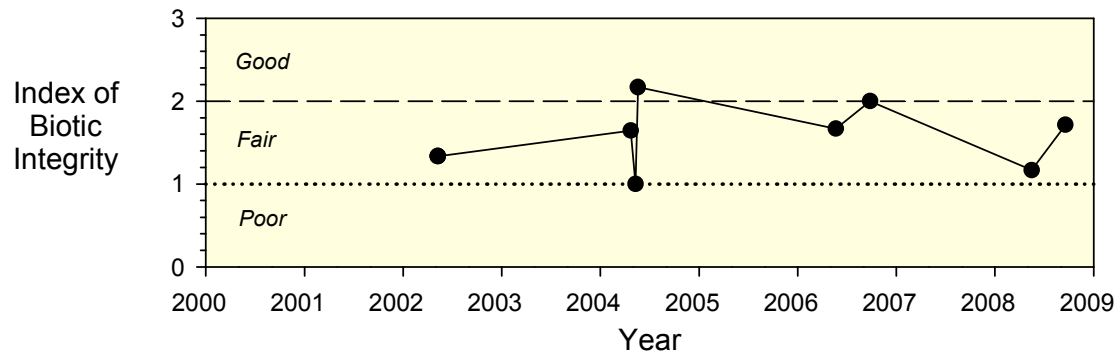
996011 - Twin Springs (Winneshiek Co.)



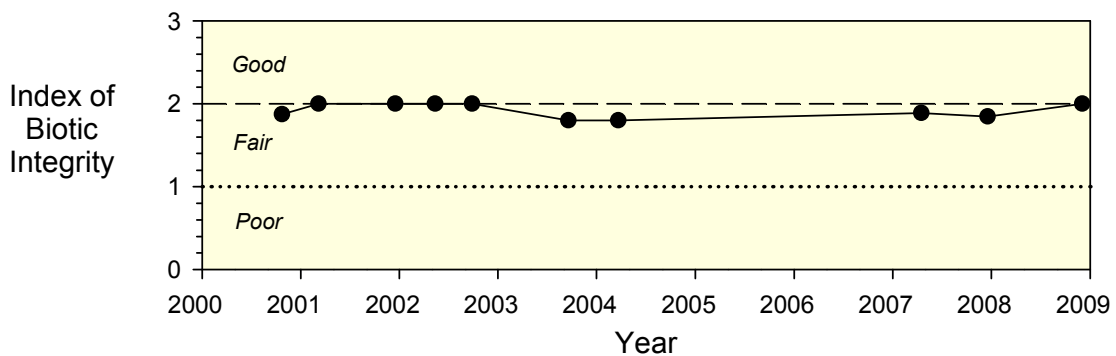
996040 - North Bear Creek (Winneshiek Co.)



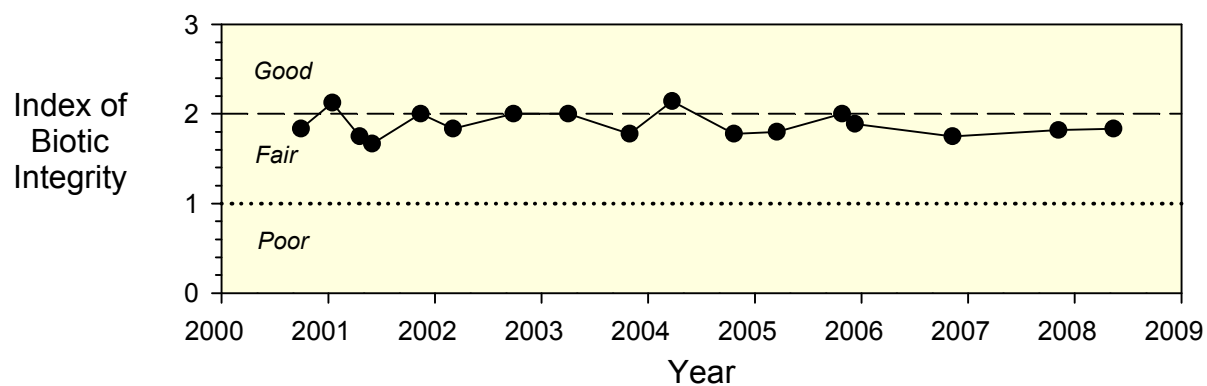
998008 - West Lime Creek (Worth Co.)



999006 - White Fox Creek (Wright Co.)



999007 - Eagle Creek (Wright Co.)



999032 - Mraz Site - White Fox (Wright Co.)

